SELECT REVIEWS.

FOR APRIL, 1809.

FROM THE BRITISH CRITICK.

Letters from the Mountains; being the real Correspondence of a Lady, between the years 1773 and 1807. The third edition. In three volumes. 12mo. London.

IN Mrs. Grant's volume of Poems, published in 1802, there was much to interest the feeling reader; and we remember that in reviewing them, we endeavoured to catch some features of the author's history, from the internal testimony of the poems. We had then no knowledge of her but what was thus obtained, nor have we now any, except what is further supplied by these letters. But the addition is considerable, and we are now enabled to trace her almost from her childhood to the present day, in a manner which makes her ten times more the object of attention and regard. Without any attempt to form a narrative, she gives us in her letters, which have every mark of being written under the impression of real circumstances and genuine feelings, a view of her friendships before marriage; of the marriages of her friends and herself; of the gradual increase of her family, and the loss of some branches of it; the sudden and unprepared loss of the amiable pastor to whom she was united; with some particulars of her subsequent struggles and sufferings. We can truly say, that very seldom, indeed, has any invented tale so strongly arrested our attention, or so warmly interested our feelings, as this genuine picture of real life. It is perfectly plain also, that a large part of the publick has felt with us; since the letters have arrived at a third, if not a fourth, edition, before we have found an opportunity to express our sentiments upon them.

It appears by the 34th letter of vol. 3, and some others near it, that the poems which we praised, were revised for the press while the loss of her husband was recent; an exertion of fortitude, which, considering the warmth of affection thus abruptly deprived of its object, is not one of the least considerable displayed in her history. The fortitude of Mrs. Grant appears to be the work of a strong mind, building on the sincerest and firmest principles of religion. That her mind is naturally strong, appears by many proofs in her letters; but natural strength would have sunk, in many instances, in which we see her rise to the occasion, by the buoyancy of religious faith and hope. In her mind we see the unusual combinations of ardour with steadiness; imagination with sound judgment; tenderness with fortitude; and the proofs of these qualities are brought together, by

the mere reunion of a series of letters, not one of which seems intended to express any thing but the feelings and sentiments of the moment. If this testimony from persons entirely unknown to her, shall reach her in some remote spot, let her receive it without the suspicion of any motive but the love of truth; and if any one should repeat to her, in future, the foolish cant that professed criticks have no feelings, let her do us the justice, in return, to say that it is false.

To select, from a book where there is so much to give us pleasure, is not easy; or rather, it is not easy to cease selecting. That we may keep within bounds, we shall confine ourselves to three passages. The first is a literary anecdote, being an account of the death of James Macpherson, of Ossianick memory.

Laggan, Feb. 20, 1796.

"Why dost thou build the tower, son of the winged days? Soon wilt thou depart with thy fathers. The blast from the desert shall rush through thy hall, and sound upon thy bossy shield," &c. &c. Do you recollect, dear madam, when I stopped with you at the gate of B—e, I repeated those lines, and observed what a suitable inscription they might prove for the front of poor James's new house. It would appear I was moved by a prophetick impulse, when I predicted that he never would see it finished. Friday last, C. V. R. dined there. James had been indisposed since the great storm, yet received his guests with much kindness; seeming, however, languid and dispirited. Towards evening he sunk much, and retired early. Next morning he appeared, but did not eat, and looked ill. R. begged he would frank a cover for Charlotte. He did so, and never more held a pen. When they left the house he was taken extremely ill, unable to move or receive nourishment, though perfectly sensible. Before this attack, finding some inward symptoms of his approaching dissolution, he sent for a consultation, the result of which arrived the day after his confinement. He was perfectly sensible and collected, yet refused to take any thing prescribed to him to the last; and that on this principle, that his time was come, and it did not avail. He felt the approaches of death, and hoped no relief from medicine, though his life was not such, as one should like to look back on at that awful period. Indeed, whose is? It pleased the Almighty to render his last scene most affecting and exemplary. He died last Tuesday evening; and from the minute he was confined till a very little before he expired, never ceased imploring the divine mercy in the most earnest and pathetick manner. People about him were overawed and melted by the fervour and bitterness of his penitence. He frequently and earnestly entreated the prayers of good, serious people of the lower class who were admitted. He was a very good natured man; and now that he had got all his schemes of interest and ambition fulfilled, he seemed to reflect, and grow domestick, and showed of late a great inclination to be an indulgent landlord, and very liberal to the poor; of which I could relate various instances, more tender and interesting than flashy or ostentatious. His heart and temper were originally good. His religious principles were, I fear, unfixed and fluctuating; but the primary cause that so much genius, taste, benevolence, and prosperity, did not produce or diffuse more happiness was his living a stranger to the comforts of domestick life, from which unhappy connexions excluded him. Tavern company, and bachelor circles make men gross, callous, and awkward; in short, disqualify them for superiour female society. The more heart old bachelors of this class have, the more absurd and insignificant they grow in the long run; for when infirmity comes on, and fame and business lose their attractions, they must needs have somebody to love and trust, and they then become the dupes of wretched toad eaters, and slaves to designing housekeepers. Such was poor James, who certainly was worthy of a better fate. His death, and the circumstances of it, have impressed my mind in a manner I could not have believed. I think we are somehow shrunk, and our consequence diminished, by losing the only person of eminence among us. 'Tis like extinguishing a light. Vol. III. p. 32.

The second specimen shall be one of the letters which were written soon after the melancholy event of Mr. Grant's death.

TO MISS DUNBAR,* BOATH.

Laggan, Jan. 1, 1802.

DEAR MADAM,

So young, and such a novice in sorrow, you have not yet learnt the weakness, the extreme languor, into which the mind sinks when the first violent bursts are over; incapable of raising itself to the true source of consolation, and ready to lean on every reed. In this state sympathy is most availing, and in this hopeless and dispirited state your letter found me.——Why then apologize for what excites my warmest gratitude? Your dear, worthy mother and you I have long known and esteemed, through the medium of your humble friend. This proof of your goodness to so great a stranger, convinces me that you are all I have been taught to imagine you. You wish to know how I bear the sudden shock of this calamity. I bore it wonderfully, considering how very much I had to lose. Still, at times, the Divine goodness supports me in a manner I scarcely dared to hope. Happily for me, anxiety for a numerous orphan family, and the wounding smiles of an infant, too dear to be neglected, and too young to know what he has lost, divide my sorrows, and do not suffer my mind to be wholly engrossed by this dreadful privation, this chasm, that I shudder to look into. A daughter, of all daughters the most dutiful and affectionate, in whom her father still lives (so truly does she inherit his virtues, and all the amiable peculiarities of his character) this daughter, is wasting away with secret sorrow, while, "in smiles, she hides her grief to soften mine."————I was too much a veteran in affliction, and too sensible of the arduous task devolved upon me, to sit down in unavailing sorrow, overwhelmed by an event which ought to call forth double exertion. None, indeed, was ever at greater pains to console another, than I was to muster up every motive for action, every argument for patient suffering. No one could say to me, "the loss is common." Few, very few indeed, had so much happiness to lose. To depict a character so very uncommon, so little obvious to common observers, who loved and revered without comprehending him, would be difficult to a steadier hand than mine. With a kind of mild disdain, and philosophick tranquillity, he kept aloof from a world, for which the delicacy of his feelings, the purity of his integrity, and the intuitive discernment with which he saw into character, in a manner disqualified him, that is, from enjoying it; for who can enjoy the world without deceiving or being deceived? But recollections crowd on me, and I wander. I say, to be all the world to this superiour mind; to constitute his happiness for twenty years, now vanished like a vision; to have lived with unabated affection together even thus long, when a constitution, delicate as his mind, made it unlikely that even thus long we should support each other through the paths of life!————What are difficulties, when shared with one whose delighted approbation gives one spirits to surmount them? Then, to hear from every mouth his modest, unobtrusive merit receive its due tribute of applause; to see him still in his dear children, now doubly dear; and to know that such a mind cannot perish, cannot suffer; nay, through the infinite merits of that Redeemer, in whom he trusted, enjoys what we cannot conceive—Dear Miss Dunbar, believe me, I would not give my tremulous hopes, and pleasing, sad retrospections, for any other person's happiness! Forgive this; it is like the overflowing of the heart to an intimate; but your pity opens every source of anguish and of tenderness. Assure your kind mother of my grateful esteem, and believe me, with sincere regard much yours. p. 110.

This is the genuine and unaffected language of feeling, and as such cannot fail to produce sympathy; especially regulated as it is by a true submission to the Divine will. The next is a poetical fragment, written not many months after, at Bristol hot-wells, to which place the author had been hurried from her home, to attend a daughter dangerously ill.

One very stormy night, lately, I could not close my eyes, nor yet read; so I had recourse to my pencil, for relief to my overburdened mind, and here is the result of this vigil of sorrow; at least as much of it as I can transmit in a letter.

Yes, to my soul, those northern winds are dear,
That howling blast is musick to my ear.
Blast, whose swift wing has swept our Alpine snows,
The rocks of Morven, and the hill of roes,

* This and some following letters were written in answer to one Miss Dunbar had, at her mother's desire, addressed to the author, condoling with her on the loss she had recently sustained.

Say, hast thou wak'd my wild harp's mournful strings;
Bear'st thou the voice of sorrow on thy wings?
Or hast thou rush'd along the sacred shade,
Where those my heart must ever weep, are laid?
From my dear native land begun thy flight—
Bring tidings to my soul, O blast of night!
When shall I view again my narrow vale,
And hear a voice in every whispering gale?
See spring's first violets deck the hallow'd ground,
And trace my children's fairy footsteps round?
Then, in a tender trance of anguish'd joy,
To my fond bosom shall I clasp my boy,
View the soft radiance of his full blue eyes,
Warm the fresh roses on his cheek with sighs,
And, while his curls of waving amber flow
With varying lustre o'er his neck of snow,
The dawn of manly beauty let me trace,
The smile benignant of his father's face;
While hope auspicious points her wand of gold,
Where future days the latent bud unfold,
And bid hereditary virtues bloom,
To deck with kindred sweets a father's tomb. p. 166.

The reader will be pleased to know that the daughter recovered, and the wishes of the fond mother were realized. These slight specimens from a work, the primary charm of which is the gradual knowledge which it gives of a very estimable character, can have no effect if they do not excite a desire to read the volumes. The observations of Mrs. Grant, whether on books or manners, are usually judicious; and we are much mistaken, if she will not have more or less of a friend in every reader of her letters.

FROM THE EDINBURGH REVIEW.

The new Practice of Cookery, Pastry, Baking and Preserving, being the Country Housewife's best Friend. By Mrs. Hudson and Mrs. Donat, present and late Housekeepers and Cooks to Mrs. Buchan Hepburn, of Smeaton, and published by her Permission. pp. 242. 8vo.

Culina Famulatrix Medicinæ; or, Receipts in modern Cookery, with a Medical Commentary, written by Ignotus, and revised by A. Hunter, M. D. F. R S. L. & E. The second Edition. York. pp. 268. 8vo.

IT seems to have been a complaint familiar in the mouths of our ancestors, and which we have too often seen cause to reecho in the present day, "That God sends good meat, but the devil sends cooks." The irritability, the obstinacy, and the perfidy of the present culinary race, indeed, obviously demonstrate their ascent from regions even hotter than those which they occupy upon earth; and, while the direct attacks of the arch enemy are opposed and counteracted by the clergy, who may be considered as the regular forces to whom our defence is intrusted, it is with pleasure we see a disposition, in the learned and experienced among the laity, to volunteer against the hordes of greasy Cossacks whom he detaches to those quarters, as marauders upon our daily patience and our annual income.

In first entering the field upon this occasion, we had some difficulty to settle the rank of these auxilaries amongst themselves, or, to drop the metaphor, we were at a loss, after considering the high claims to attention preferred by both publications, to which we ought to give the precedence in our critique. It is true, Mesdames Hudson and Donat prefer a bold claim to the grateful recollection of those who have regaled on their dainties. "It becomes them

not," as they are modestly pleased to express it, "to judge of their own merit; but with honest confidence they appeal to a numerous list of subscribers, who have *eat* and *judged* of their works." In this passage there is some ambiguity. If, by this intimation, it is meant that the subscribers actually eat the volume to which they subscribed, we, the Reviewers, will frankly tell Mrs. Hudson and Mrs. Donat, that, notwithstanding the evangelical authority which may be quoted for this literary diet, we cannot bring our stomachs to submit to it; especially, as, in one sense, we are already obliged to devour many more works than we are well able to digest. On the other hand, if the judgment referred to was formed from actually partaking of the dishes analysed in this volume, we only want the opportunity, happily enjoyed by these subscribers, conscientiously to join in their verdict. Upon the slightest intimation, the long coach shall convey our critical fraternity to the hospitable mansion where these fair dames have presided, and do preside over the good things of the earth; and then—*fiat experimentum!*

By the same rule, although Ignotus resides at rather too great a distance for an inroad of this nature, yet an actual experiment might be usefully made on a Yorkshire pie, transmitted by the mail or wagon. And upon this fair system of practical knowledge did we propose to have decided the merits of these candidates for culinary renown, till we recollected the unlucky termination of a course of lectures on the art of cookery in this city, which was abruptly broken off by the indignant professor, in consequence of a hungry student having eat up a principal specimen, as it circulated through the class for the admiration, but not the consumption of the audience. Deprived, therefore, of this most agreeable mode of exercising our critical sagacity, we choose to arrange the precedence of these rival works upon the gallant principle of *place aux dames;* and we are convinced, that Ignotus and his editor, although the latter be M. D. F. R. S. L. & E. will, with their usual good humour, give the front rank to the "present and late Housekeepers and Cooks to Mrs. Buchan Hepburn of Smeaton."

The prefatory advertisement to this book is too interesting to be suppressed. It shows at once the deep learning of the ladies by whom it was written; their honest sense of the dignity of their vocation; and their laudable zeal for its being conducted on the true principles of the British constitution, as well as upon those of sound, experimental philosophy.

The late Dr. Black, professor of chymistry in the university of Edinburgh, has instructed and enlightened the world by his philosophical, ingenious, and patient researches in that science, which, somewhere in his works, he has defined to be, "the effect of heat and mixture upon bodies."

This definition applies as directly to the cook as to the chymist. His kitchen is his school; his boilers, his digesters; his stoves, and not forgetting his cradle-spit, correspond to the crucible, the alembick, the retort, and the other apparatus of the chymist; and both are equally applied to prove the effect of heat and mixture upon bodies. It must be admitted, at the same time, that the range or kingdom of the bodies they severally operate upon, are wonderfully different. The chymist gropes below ground, and in the dark, through the mineral kingdom; while the cook operates in the light, and above board, upon the animal and the vegetable world.

The judges, also, who are to decide upon the result of their several experiments, are not less different and opposite, than the subjects they have operated upon. The chymist lays his experiments, stuffed, generally, with mathematical demonstrations, or the more abstruse calculations of the *minus* and *plus* of algebra, before some Royal Society, composed of a few meagre philosophers, "with spectacles on's nose;" while the judges the cook appeals to, are all the jolly *bons vivants* in the Imperial Kingdom; and his compounds are drawn from every thing that is delicate and high-flavoured in the animal and in the vegetable world; and, without any other demonstration than what his larding and his sauces give, he appeals directly to the sound and nice palate of his numerous judges.

The editors of the following culinary experiments do not pretend to rank with the ingenious and the philosophick Dr. Black, Lavoisier, or other eminent chymists of the modern school. As, however, they are professed cooks, the natural attachment and vanity of *metier* may perhaps allow them to say, without offence, that they do hold the "*Art of Cookery*" to be not the least useful branch of the great and comprehensive science of chymistry; and, having already avowed themselves professed cooks, they will not trouble their readers with a minute detail of the interesting incidents of their lives, as too generally is the practice of modern authors; such as, where they were severally born; where educated and initiated in the mysteries of cookery. Suffice it to say, that they have each, successively, and for years, officiated as cook and housekeeper in the kitchen of Mrs. Buchan Hepburn, of Smeaton, who has kindly allowed them, for their own benefit, to publish the following receipts, which they have practised and performed there. It becomes not them to boast of their own merit; but, with honest confidence, they appeal to a numerous list of subscribers who have *eat* and *judged* of their works.

They have subjoined many valuable receipts in housekeeping, for curing beef, for making of hams and bacon, for the dairy and pastry, baking, and the best receipt for artificial yeast, which can be made and used the same day, and does not make the bread sour; all of which they have practised at Smeaton with wonderful success. *In short, they now offer to the world, not a cobweb theory of cookery, such as the flimsy constitution-mongers of France have spun for these* 12 *or* 15 *years past out of their distempered brains, to deceive and ruin that miserable people.* No! here facts only are narrated; and by a correct attention to the directions given, the cook, whether male or female, may rest assured of meeting the approbation of the nicest and most delicate palate; and will prove particularly useful for those who reside in the country. The different receipts for making the India currie powder and pellow, are taken from the best practice of their native country.

From this advertisement much extraordinary information may be derived. We have already noticed, that there is great room to believe that the subscribers, to testify their approbation of the contents, actually eat the book, like the man who, in his zealous applause of roast beef, devoured the spit from which it had been taken: but this is not all. We are informed, in point of historical fact, that the various legislators of France have, for these twelve or fifteen years past, been busily engaged in digesting systems of cookery. And, truly, though this is mentioned in rather derogating terms, on account, apparently, of their bad success, we consider the fact to be, on the whole, a discovery in their favour; since, for our own parts, we never suspected them to be so usefully or innocently employed It is a fact of subordinate importance, but nevertheless somewhat curious, that the whole Royal Society make use of one pair of spectacles, placed on the nose, doubtless, of the president. We have long observed an unvaried coincidence in the views and pursuits of this learned body, and are happy to be able to trace it to a cause equally unsuspected and satisfactory.

As to the receipts which follow this curious and instructive preface, they are distinctly expressed; and from the well known hospitality and elegance of the family in which they were composed, we have no doubt they will be found admirable. We must observe, however, that they are arranged in rather a miscellaneous order; for after a receipt to make "a half-peck bun," we pass abruptly to another which begins: "*The slaked lime* must be well sifted and steeped in a pit," &c. &c. and again: "Take two shovels full of *coarse water sand*, one ditto of hammer slag well sifted, one ditto *powdered brick dust*," &c. Now, although we are specially directed that the former mixture shall be wrought into "thin porridge" and the latter made neither "too fat nor too poor," yet, we are somewhat inclined to doubt, whether any management or attention in the preparation, could render them digestible by human stomachs, or, indeed, whether they can be strictly said to belong to the arts of cookery, pastry, baking, or preserving, unless the ladies are of opinion with the Copper Captain, that "a piece of buttered wall is excellent." Other re-

ceipts occur, in which "an ounce of *white arsenick*," and the "expressed juice of the *deadly nightshade*," are the chief ingredients. These we were, at first glance, inclined to suppose borrowed from the French systems already mentioned; perhaps the original recipe for a restorative cordial *à l'hopital*, or a *fricandeau à Toussaint*,—if, indeed, the patriotick composers did not design them for the regale of the emperour himself on his long announced visit.

The very *errata* of this work evince the care and deep science of the compilers. Some corrections refer to the ingredients; and it will be prudent to attend to them specially, as the errour, according to the phrase of the civilians, is sometimes in *substantialibus*. Thus, we have "for *linen*, read *lemon*;" "for *chicken*, read *onion*;" "for *pepper* read *paper*." Others regard accessories; as, "after *raspberries* [in a receipt for making jam] add *together with two pounds and a half raw sugar*;" or, "for *mix it all with the foregoing ingredients*, read *and mix them with a mutchkin and a half of brandy*." Others refer to proportion; as, "for *pint and a half*, read *bit*;" and, "for *half a*, read *three thirds*." This last correction appeared to us to conceal some new and abstract doctrine in fractions, adopted, perhaps, from the facetious Costard; for ladies acquainted with philosophy cannot be ignorant of Shakspeare.—'*Biron*. Three times three is nine. *Costard*. Not so, Sir, under correction, I hope it is not so. *Biron*. By Jove, I always took three threes for nine. *Costard*. O Lord, Sir, it were a pity you should get your living by reckoning, Sir."—

Upon the whole, besides the receipts for dressed dishes, which it is not in the power of every housewife to place on her board, this little work contains many useful instructions concerning the poultry yard and dairy, which afford the cheapest and most wholesome regale to a country family.

The work of Ignotus, being more systematick and classical, claims a graver and more elaborate discussion. And, in the first place, we have to remark, that whereas all other books of cookery contain domestick receipts for medicine, promiscuously inserted amongst those for food, Ignotus, with the assistance, we presume, of his learned editor, has accompanied the description of each savoury mess, with a medical commentary on its use and abuse; an invitation to partake, or a caution to shun it. A suspicious person, considering the profession of the editor, might here be tempted to exclaim:

Timeo Danaos et dona ferentes;

thinking, perhaps, that such a connexion may subsist betwixt a doctor and a disease, as betwixt a sportsman and his game, since, although the business of each is the destruction of individuals, both must be presumed to take great care to encourage the breed. But we will cheerfully acquit Ignotus of any premeditated design against our health; for, although his plentiful table, stocked with the dainties described in his work, may occasionally have converted a guest into a patient, we are sure it could not be with the felonious purpose of indemnifying himself for the expense of the entertainment. For this we appeal to the following liberal sentiment, appended to an excellent receipt for peas-soup.

This is a good set-off against high seasoned dishes. An occasional abstinence that does not allow the stomach to be quite empty at any one time, is a measure highly salutary, and, for religious purposes, is perhaps preferable to long fasting; a practice, medically to be condemned. An honest physician who, regardless of his fees, can view with pleasure the healthy state of a family where he has been received with kindness, will be happy in the recommendation of a practice that is calculated to preserve the general health of his friends. But, to the disgrace of a profession, otherwise useful and honourable, there are some men who, like the savages upon a rocky coast, view an epidemical disease as a "God-send." p. 113-114.

At the same time, while we do justice to the liberality of the views of Ignotus, we can by no means acquit him of leading his readers into temptation. It is hardly enough to say to an epicure, in the words of Cato: "Your death and life, your bane and antidote are both before you." Describing a rich dish, and then stigmatizing it as unwholesome, is only calling for the water engine after you have set the house on fire. Our first parents eat, when death was denounced as the inevitable consequence; and their descendants, with undegenerated courage, and a full consciousness of their danger, are ready to eat themselves into gout, and drink themselves into palsy. To add to the weight of his remonstrances, Ignotus has called in the assistance of Archeus, the genius of the stomach, a personification by which Van Helmont and others expressed the digestive power. Lest the unlearned reader should suppose Archeus, whose authority is so often referred to, to be the name of a French *bon vivant*, or a Hungarian professor, Ignotus gives us the following account of his person and office.

Van Helmont gave the name of Archeus to a spirit that he supposed existed in the body, for the purpose of regulating and keeping in order the innumerable glands, ducts, and vessels; and though this spirit visits every part, his chief post is at the upper orifice of the stomach, where he acts the part of a customhouse officer, allowing nothing to pass unexamined that, by the law of nature, has the appearance of being contraband. This part of his duty being only required during meal-times, the remaining part of the twenty-four hours (for he never sleeps) is employed in rubbing, scrubbing, and repairing the waste of the body occasioned by the continual friction of the fluids against the sides of the containing vessels. For this last purpose, and an important one it is, he is supposed to select from the chyle such particles as he may stand in need of; but as he may sometimes be in want of one kind more than of another, he very judiciously obtains it, by bringing on a *longing* for a particular kind of food. For example; when the internal coat of the intestines is abraded by a diarrhœa or dysentery, a longing is brought on for fried tripe with melted butter, as containing the greatest quantity of materials proper for the repair of bowels so disordered. To this circumstance, modern physicians do not sufficiently attend, neither are they sufficiently awake to the necessity of prescribing a diet for persons in health, whose chyle should be of a nature for supplying Archeus with *general* materials, without compelling him to call for them. The folly, therefore, of keeping to one kind of diet, whether high or low, is abundantly evident, as, in that case, Archeus must sometimes be overstocked with materials that he may have no occasion for, and be in want of such as his office may stand in need of. And here it will be necessary to remark, for the information of medical men, that a microscopical examination of the chyle of different men, made after sudden deaths, has proved, to a demonstration, that the chyle of the human body contains different shaped particles, round, oval, long, square, angular, kidney-shaped, heart-shaped, &c. varying according to the food taken in. In consequence of this important discovery, the practitioner has only to direct such food as may contain the particles that Archeus may stand in need of. For example: Are the kidneys diseased? Then prescribe stews and broths, made of ox, deer, and sheep's kidneys. Asthmas require dishes prepared from the lungs of sheep, deer, calves, hares, and lambs. Are the intestines diseased? Then prescribe tripe, boiled, fried, or fricasseed. When this practice has become general, Archeus will be enabled to remove every disease incident to the human body, by the assistance of the cook only. And, as all persons, from the palace to the cottage, will receive the benefit of my discovery, I shall expect a parliamentary reward, at least equal to what was given to Mrs. Stevens, Dr. Jenner, and Dr. Smyth. On the last revision of the college dispensatory, among other things of less moment, such as ordering fomentations to be made with distilled water, the name of Archeus was changed into Anima Medica, as more expressive of a *Maid Servant of all Work*. With men of deep researches, I will not dispute the propriety of the alteration, as I conceive that such a violence could not be done but after serious investigation. p. 119. 122.

This extract may give the reader some idea of the lively manner in which Ignotus has handled his subject. In fact, the whole book is very entertaining, and excites no small degree of interest, especially if read about an hour before dinner. The medical remarks are excellent, although

apparently too indulgent towards the *gourmand*. The author stands completely exculpated from the charge of Dr. Last against the regular physicians, who "drenched the bowels of Christians with pulse and water, as if they were the tripes of a brute beast." Thus it is remarked, "as a singular circumstance, that persons of a gouty habit should be most fond of high-seasoned dishes;" but the singularity would have vanished, had the proposition been, that the persons most fond of high-seasoned dishes usually have a gouty habit. It was not, however, to be expected, that with a stoical severity, Ignotus should bluntly attack the very criticks on whose verdict his fame must depend. He is not sparing of gentle hints for their welfare; and compounds, on the part of Archeus, for three days' high living, with a fourth day's temperance, and occasionally some gentle physick.

> Where truth commands, there's no man can offend,
> That with a modest love corrects his friend;
> So the reproof has temper, kindness, ease,
> Though 'tis in toasting bread, or butering peas.

In fine, as long as a man thinks more frequently and more seriously about his dinner than about any thing else, as was the unvaried opinion and practice of Dr. Johnson, so long will the parsley wreath won by Ignotus remain unblighted. The work is, with great propriety, dedicated "To those gentlemen who freely give two guineas for a turtle dinner at the tavern, when they might have a more wholesome one at home for ten shillings." A fatted hog, the emblem, perhaps, of one of these worthy patrons, decorates the frontispiece. And so we take leave of Ignotus, in the words of Beaumont and Fletcher, as of "a gentleman extraordinarily seen in deep mysteries; well read, deeply learned, and thoroughly grounded in the hidden knowledge of all sauces, sallads, and pot-herbs whatsoever."

FROM THE EDINBURGH REVIEW.

Nouvelles Observations sur les Abeilles, adresseés à M. Charles Bonnet, par Francois Huber.

New Observations on the Natural History of Bees. By Francis Huber. Translated from the original. 12mo. pp. 300. Edinburgh. London.

THE natural history of the common bee has been more carefully examined, and more amply treated of than that of any other of the insect tribe. Yet so complicated and extraordinary are some of the processes of nature, that the most diligent observers were long utterly unable to account for some circumstances in the history of this insect, and published to the world the most opposite explanations. Several of the most important and intricate problems, however, seem now to be finally resolved by the Genevese observer, M. Huber; of whose valuable little work we purpose to lay before our readers a pretty full analysis. We regard the facts contained in this volume, as extremely important to the naturalist; for they not only greatly elucidate the history of this wonderful insect, but present some singular facts in physiology hitherto unknown, and even unsuspected.

For the sake of those who may never have made bees the particular object of their study, it may not be unacceptable, previously to sketch, in a very few words, the striking outlines of their history; and to explain some terms generally employed in treating of them.

A hive contains three kinds of bees. 1. A single *queen bee*, distinguishable by the great length of her body, and the proportional shortness of her wings. 2. *Working bees, female nonbreeders;* or, as they were formerly

called, *neuters*, to the amount of many thousands. These are the smallest sized bees in the hive, and are armed with a sting. 3. *Drones*, or *males*, to the number, perhaps, of 1500 or 2000. These are larger than the workers, and of a darker colour. They make a great noise in flying, and have no sting. The whole labour of the community is performed by the workers. They elaborate the wax and construct the cells; they collect the honey and feed the brood. The drones, numerous as they are, serve no other purpose than to ensure the impregnation of the few young queens that may be produced in the course of the season; and they are regularly massacred by the workers in the beginning of autumn.

It is the office of the queen bee to lay the eggs. These remain about three days in the cells before they are hatched. A small white *worm* then makes its appearance, called indifferently *worm*, *larva*, *maggot*, or *grub*. This larva is fed with honey for some days, and then changes into a *nymph* or *pupa*.* After passing a certain period in this state, it comes forth a perfect winged insect.

M. Huber sets out with describing the kind of improved glass hive, which he employed in his experiments, and which he himself invented. He styles it the *leaf-hive* or *book-hive* [*ruche en feuillets*, or *ruche en livre*] from its opening and shutting somewhat in the manner of the leaves of a book. It consists of several frames or boxes, a foot square, and in width fifteen French lines, or sixteen English: that is, an inch and one third. The boxes are placed parallel to each other, and connected together by hinges. Availing himself of a known instinct in the bees leading them to complete any piece of a comb in the direction in which they find it begun, unless they meet with some insurmountable obstacle, he placed pieces of comb in each box, in such a position as to induce them to build perpendicular to the horizon. The lateral surfaces of the combs were thus only three or four lines distant from the glass panes; and, by opening the different divisions of the hive successively, both surfaces of every comb were, at pleasure, brought fully into view. M. Huber did not experience any difficulty in introducing swarms into these leaf-hives; and he found, that after the lapse of about three days, when the colony was fairly established, the bees submitted patiently to his daily inspections. Their tranquillity he ascribes, with some probability, to the surprise, and perhaps fear, produced by the sudden admission of the light; for he observed that they were always less tractable after sunset. An engraved plan of the leaf-hive accompanies the work; and from it, along with the explanation given by the author, we have no doubt that any person, fond of observing the wonderful economy of the busy tribe, might easily construct such a hive. And we believe that he would also find it most excellently adapted to the purpose in view. Both the queen bee and the drones being considerably larger than the working bees, by adapting glass tubes exactly to the size of the workers, both queens and drones may be effectually excluded, or effectually kept prisoners, as the nature of the experiments may require.

The work appears in the form of letters, written, or supposed to be written, by M. Huber to the late M. Bonnet, the celebrated author of the *Contemplation de la Nature*. Nine of the letters are occupied with the

* Some authors employ the terms *chrysalis* and *aurelia*, in speaking of bees, as if they were synonimous with *nympha*: but a nymph is distinguished by being always rather soft; of a pale or dull colour; and exhibiting the traces of the extremities; while a *chrysalis* or *aurelia* is crustaceous, and generally, as implied in the name, of a golden yellow colour.

natural history of the queen bee; three treat of the formation of swarms; and the last, or thirteenth letter, contains some economical considerations on bees. The experiments are detailed with great perspicuity, pretty much in the familiar style in which they had been entered in M. Huber's journal. By this means, the reader is in some measure led to consider himself as looking on, or assisting the author to perform them. Subjoined to the first letter, there is an epistle from M. Bonnet to Huber, in which that philosopher suggests a number of experiments, the prosecution and results of several of which, are related in the subsequent part of the work.

In the first two letters, he treats of the impregnation of the queen bee, a subject hitherto involved in the most profound obscurity. The drones are evidently males; but the most careful observation had never been able to detect any thing like sexual intercourse between them and the queen bees. Schirach, a German naturalist, well known for his discoveries concerning bees, boldly denied that such intercourse was necessary to her impregnation; and in this he is stoutly supported by our countryman Bonner. Swammerdam, again, remarking that the drones, at certain seasons, when collected in clusters, exhaled a strong odour, broached an opinion that this odour, proceeding from whole clusters of drones, was a kind of *aura seminalis*, which produced fecundation by penetrating the body of the female. There are generally from 1500 to 2000 males in a hive, while there are only two or three queens to be impregnated in a season: and Swammerdam seemed to have found, in his hypothesis, an easy explanation of this enormous disproportion in the numbers of the sexes. Réaumur, however, combated this fanciful doctrine; and our author has confuted it by direct experiment. He confined all the drones of a hive in a tin case, perforated with minute holes, sufficient to allow any emanation to escape This tin case was placed in a well inhabited hive, where there was a young queen, who could not fail to be subjected to the odour; but she remained barren.

Maraldi was the first to suggest another hypothesis, which apparently possessed a greater degree of probability. He imagined that the eggs were fecundified by the drones, after being deposited in the cells, in a way analogous to the fecundation of the spawn of fishes by the milters. Mr. Debraw, of Cambridge (in Phil. Trans. 1777) strenuously supported this doctrine, and gave it a certain degree of plausibility, by referring to numerous experiments. He even affirmed, that the milt-like fluid of the drones might be seen in the cells. The supposition, that the drones performed this important office, satisfactorily accounted for the prodigious numbers of them found in a hive. But Mr. Debraw does not seem to have attended to this circumstance; that great numbers of eggs are laid by the queen between the months of September and April which prove fertile, although in that season there exist no males to supply the milt-like liquor. M. Huber is of opinion, that the appearance of a fluid had been merely an optical illusion, arising from the reflection of the light at the bottom of the cell. He made the direct experiment of rigidly excluding every male from a hive, and yet found that eggs laid by the queen in this interval were as fertile as when the males were admitted. Mr. Debraw's opinion, therefore, must be erroneous; for the fertility of these eggs must have depended on the previous impregnation of the queen herself, and not on any thing that could happen after they were deposited.

M. Hattorf, in a memoir published in Schirach's work, * endeavoured to show that the queen is impregnated by herself. This was also M. Schirach's opinion; and it seems to be that of Mr. Bonner. It is an opinion, however, that requires no refutation. The cautious Huber, remarking how much confusion had arisen from making experiments with queens taken indiscriminately from the hive (the source of the errour just mentioned) thenceforward selected those which were decidedly in a virgin state, and with whose history he was acquainted from the moment they had left the cell.

The illustrious Linnæus was of opinion that the queen bees formed an actual union with the drones; and he seems even to have suspected that this union proved fatal to the latter. His opinion on both points has now been verified. For, from many experiments made in the course of the years 1787 and 1788, M. Huber found, that the young queens are never impregnated as long as they remain in the interiour of the hive. If confined within its walls, they continue barren, though amidst a seraglio of males. To receive the approaches of the male, the queen soars high in the air, choosing that time of day when the heat has induced the drones to issue from the hive; and love is now ascertained to be the motive of the only distant journey which a young queen ever makes. From this excursion she returns in the space of about half an hour, with the most evident marks of fecundation; for, far from being satisfied with the prolifick *aura* of Swammerdam, she actually carries away with her the *ipsa verenda* of the poor drone, who never lives to see his offspring; but falls a sacrifice to the momentary bliss of his aërial amour. The most complete proof of these facts is afforded by the detail of a number of concurring experiments. It is curious that our countryman Bonner should have remarked those aërial excursions of the young queens, without ever suspecting their real object, or observing the marks of fecundation upon their return to the hive. The worthy bee-master thought they were merely taking an airing. "I have often," says he, "seen young queens take an airing on the second or third day of their age." † M. Huber also assigns a satisfactory cause for the existence of such a great number of males. "As the queen is obliged to traverse the expanse of the atmosphere," he observes, "it is requisite the males should be numerous, that she may have the chance of meeting some one of them. But the reason why impregnation cannot be accomplished within the hive, has not yet been ascertained."

In letter third, M. Huber states the accidental discovery of the very singular and unexpected consequences which follow from retarding the impregnation of the queen bee beyond the twentieth or twenty-first day of her life. In the natural order of things, or when impregnation is not retarded, the queen begins to lay the eggs of workers forty-six hours after her intercourse with the male, "and she continues for the subsequent eleven months to lay these alone [only;] and it is only after this period, that a considerable and uninterrupted laying of the eggs of drones commences. When, on the contrary, impregnation is retarded after the twentieth day, the queen begins, from the forty-sixth hour, to lay the eggs of drones; and she lays no other kind during her whole life." It would be tedious to detail the experiments. They were numerous, and the results uniform. "I occupied myself," says M. Huber, "the remainder of 1787, and the two subsequent years, with experiments on retarded fecundation, and had constantly the same results. It is undoubted, therefore, that when the copulation of queens is retarded beyond the twentieth day, only an imperfect impregnation is operated; instead of lay-

* Histoire Naturelle de la Reine des Abeilles, 1772.

† Bonner on Bees, 8vo edit. p. 165.

ing the eggs of workers and of males equally, she will lay those of males only." p. 52.

This discovery is entirely M. Huber's own; and so difficult is it to offer any plausible explanation of the fact, that he himself has scarcely attempted it. The difficulty is much increased when we consider, that a single interview with the male is sufficient for fecundifying the whole eggs that a queen will lay in the course of at least two years, p. 54.; and that therefore it would be in vain to say, that an early impregnation may be necessary for the eggs of workers, and a later for those of drones. It will be recollected, that, in the natural state, the queen lays the eggs of workers for the first eleven months, to the amount of many thousands, before she lays a single drone egg; but that when her impregnation has been for a few days retarded, she begins at once to lay the eggs of drones. The generally admitted principle of the successive expansion of eggs, renders this very puzzling; for how comes it that the eggs of drones, which naturally require eleven months to come to perfection in the ovaria of the queen, are, in this case, perfected in forty-eight hours? What has become of the vast multitude of workers' eggs that the queen ought first to have deposited? It is certain that, during the first twenty days of her life, the eggs of workers ought to be laid; but it would seem, that intercourse with the male being denied, the first set of eggs become effete; they waste away, and perhaps drop from the animal. A fact mentioned by M. Huber, in a subsequent page, p. 65, seems to support this notion. "The body of those queens whose impregnation has been retarded, is shorter than common: the extremity remains slender, while the first two rings next the thorax are uncommonly swoln." On dissecting the double ovary, both branches were found to be equally expanded and equally sound; but the eggs were apparently not placed so closely together as in common queens. A queen, in ordinary circumstances, lays about 3000 eggs in the space of two months, which is at the rate of 50 a day. It was not correctly ascertained, whether the queens whose impregnation was retarded laid a number of drone eggs corresponding to the whole number of eggs both of workers and drones which they ought to have deposited; but it is certain that they laid a greater number of drone eggs than they ought naturally to have done. The hives in which only drones were produced, always failed, and, indeed, generally broke up before the queens had done laying; for, after the lapse of some time, the workers finding themselves overwhelmed with drones, *fruges consumere nati*, and receiving no increase of their own number, abandoned the hive, and at the same time despatched their unfortunate sovereign.—In order to throw some light on this curious subject, M. Huber suggests the propriety of instituting analogous experiments on other insects; by retarding, for example, the impregnation of the females of other species of bees, of wasps, and of butterflies.

In the course of a number of experiments made on this subject, some other curious points in the natural history of the bee were accidentally illustrated. Thus a queen, twenty-seven days old, having been impregnated on the 31st of October, did not begin to lay at the expiration of forty-six hours, apparently on account of the weather having, in the mean time, become extremely cold. She was confined in a hive all winter; and on the 4th of April ensuing, prodigious numbers both of larvæ and pupæ were found; and all of them produced drones.

Here, as in other experiments, retardation had rendered the queen incapable of laying the eggs of workers: but this result is the more remarkable, as she did not commence laying until four months and a half after fecundation. It is not rigorously true, therefore, that the term of forty-six hours elapses between the copulation of the female and her laying; the interval may be much longer if the weather grows cold. Lastly,

it follows, that although cold will retard the laying of a queen impregnated in autumn, she will begin to lay in spring without requiring new copulation. p. 63.

Again, M. Huber had an opportunity of correcting those naturalists who maintain, that the working bees are charged with the task of conveying into proper cells such eggs as may be misplaced by the queen. He put a queen, who was ready to lay workers' eggs, into a prepared hive which contained only the cells of drones, but which communicated, by a narrow tube (sufficient to permit workers to pass, but too small for the queen) with another hive which contained plenty of the cells of workers. The queen, taught by nature the kind of eggs she was about to lay, searched about for suitable cells; but finding none, she chose rather to drop her eggs at random, than place those of workers in the cells of drones. The eggs thus dropped soon disappeared; and careless observers might have concluded that they were carried off by the workers to the proper cells; but none were to be seen there; and the author soon ascertained that they were really eaten up by the workers. Thus it was proved that the care of depositing properly the respective kinds of eggs, is left entirely to the instinct of the queen, and that the workers running off with misplaced eggs in order to devour them, has been mistaken for their tenderly conveying them to the right cells.—When the impregnation of the queen bee is retarded, her instinct seems to suffer; for she then lays her eggs indiscriminately in large and in small cells; those laid in large cells producing large drones; those in small cells, small drones; and she has been known to lay the eggs of drones even in royal cells, some of which kind of cells the bees always take care to construct whenever the queen begins to lay male eggs. It is remarkable that the workers were, on those last occasions deceived, and treated the embryo drones as if they had been truly of the royal blood.

The working bees had for ages been considered as entirely destitute of sex; and hence, in the writings of many authors, they are denominated *neuters*. From the experiments of Schirach and of Huber, it seems now to be clearly ascertained that the workers are really of the female sex; but that the organs of generation are small and imperfect, being capable, however, of development, if the larvæ be fed with royal jelly.

Letter fourth accordingly treats of Schirach's curious discovery, which is amply confirmed by Huber. The discovery was this: That when bees are, by any accident, deprived of their queen, they have the power of selecting one or two grubs of workers, and of converting them into queens; and that they accomplish this, by greatly enlarging the cells of those selected larvæ, by supplying them more copiously with food, and with food of a more pungent sort than is given to the common larvæ. "All my researches," says our author, p. 77, "establish the reality of the discovery. During ten years that I have studied bees, I have repeated M. Schirach's experiment so often, and with such uniform success, that I can no longer have the least doubt on the subject." The same testimony is given by Mr. Bonner, who declares, that "having repeated the experiment again and again, he can affirm it with the utmost confidence and certainty." * M. Schirach's discovery may now, therefore, be considered as established beyond controversy; and the late Mr. John Hunter's sarcastick strictures, in the Philosophical Transactions for 1792, must consequently fall to the ground. Mr. Key's violent scepticism must at length also be overruled. That gentleman has declared that he made experiments for eight years on the subject, without obtaining a single favourable result; † but this ill luck can now, we think, be ascribed only to some un-

* Bonner on bees, p. 60.

† Bath Society's Papers, vol. V.

accountable awkwardness, or some unhappy blunder in performing the experiments.

M. Huber gives the following curious account of the manner in which bees proceed in forming capacious cells for the workers' grubs destined to royalty.

Bees soon become sensible of having lost their queen, and in a few hours commence the labour necessary to repair their loss. First, they select the young, common worms, which the requisite treatment is to convert into queens, and immediately begin with enlarging the cells where they are deposited. Their mode of proceeding is curious; and the better to illustrate it, I shall describe the labour bestowed on a single cell, which will apply to all the rest containing worms destined for queens. Having chosen a worm, they sacrifice three of the contiguous cells; next they supply it with food, and raise a cylindrical enclosure around, by which the cell becomes a perfect tube, with a rhomboidal bottom; for the parts forming the bottom are left untouched. If the bees damaged it, they would lay open three corresponding cells on the opposite surface of the comb, and consequently destroy their worms, which would be an unnecessary sacrifice, and nature has opposed it. Therefore, leaving the bottom rhomboidal they are satisfied with raising a cylindrical tube around the worm, which, like the other cells in the comb, is horizontal. But this habitation remains suitable to the worm called to the royal state, only during the first three days of its existence. Another situation is requisite for the other two days it is a worm. Then, which is so small a portion of its life, it must inhabit a cell nearly of a pyramidal figure, and hanging perpendicularly. The workers, therefore, gnaw away the cells surrounding the cylindrical tube, mercilessly sacrifice their worms, and use the wax in constructing a new pyramidal tube, which they solder at right angles to the first, and work it downwards. The diameter of this pyramid decreases insensibly from the base, which is very wide, to the point. In proportion as the worm grows, the bees labour in extending the cell, and bring food, which they place before its mouth, and around its body, forming a kind of cord around it. The worm, which can move only in a spiral direction, turns incessantly to take the food before its head: it insensibly descends, and at length arrives at the orifice of the cell. Now is the time of transformation to a nymph. As any further care is unnecessary, the bees close the cell with a peculiar substance appropriated for it, and there the worm undergoes both its metamorphoses. p. 78—80.

Our author states several points, however, in which his experience leads him to differ from M. Schirach. The latter observer having remarked, that larvæ three days old were generally selected for the royal treatment, concluded that this age of three days was an essential requisite; but M. Huber found, that those two days old, or only a few hours old, were sometimes chosen to the throne, and became perfect queens. We shall extract one experiment at length, as it both demonstrates the reality of common larvæ being converted into queens, and shows the little influence which their age has on the effects of the operation.

I put some pieces of comb, with some workers' eggs, in the cells, and of the same kind as those already hatched, into a hive deprived of the queen. The same day several cells were enlarged by the bees, and converted into royal cells, and the worms supplied with a thick bed of jelly. Five were then removed from those cells, and five common worms, which, forty-eight hours before, we had seen come from the egg, substituted for them. The bees did not seem aware of the change; they watched over the new worms the same as over those chosen by themselves; they continued enlarging the cells, and closed them at the usual time. When they had brooded on them [for such seems to be M. Huber's opinion] for seven days, we removed the cells, to see the queens that were to be produced. Two were excluded, almost at the same moment, of the largest size, and well formed in every respect. The term of the other cells having elapsed, and no queen appearing, we opened them. In one was a dead queen, but still a nymph. The other two were empty. The worms had spun their silk coccoons, but died before passing into their nymphine state, and presented only a dry skin. I can conceive nothing more conclusive than this experiment. It demonstrates that bees have the power of converting worms of workers into queens, since they succeeded in procuring queens by operating on the worms which we ourselves had selected. It is equally demonstrated, that the success of the operation does not depend on the worms being three days old, as those intrusted to the bees were only two. p. 81—82.

He mentions another experiment, by which it appears that larvæ only a few hours old, as already hinted, are sometimes destined to replace a lost queen.

In his fifth letter M. Huber relates some experiments which confirm the singular discovery of M. Riems, concerning the existence, occasionally, of common working bees that are capable of laying eggs—which, we may remark, is certainly a most convincing proof of their being of the female sex. Eggs were observed to increase in number daily in a hive in which there were no queens of the usual appearance; but small queens considerably resemble workers, and to discriminate them required minute inspection.

My assistant, says M. Huber, then offered to perform an operation that required both courage and patience, and which I could not resolve to suggest, though the same expedient had occurred to myself. He proposed to examine each bee in the hive separately, to discover whether some small queen had not insinuated herself among them, and escaped our first researches.—It was necessary, therefore, to seize the whole bees, notwithstanding their irritation, and to examine their specifick character with the utmost care. This my assistant undertook, and executed with great address. Eleven days were employed in it; and, during all that time, he scarcely allowed himself any relaxation, but what the relief of his eyes required. He took every bee in his hand; he attentively examined the trunk, the hind limbs, and the sting; and he found that there was not one without the characteristicks of the common bee, that is, the little basket on the hind legs, the long trunk, and the straight sting. p. 91—92.

They afterwards seized a fertile worker in the very act of laying; and they thus describe her appearance, p. 94. "She presented all the external characteristicks of common bees; the only difference we could recognise, and that was a very slight one, consisted in the belly seeming less, and more slender than that of workers. On dissection, her ovaries were found more fragile, smaller, and composed of fewer oviducts than the ovaries of queens. We counted eleven eggs of sensible size, some of which appeared ripe for laying. This ovary was double, like that of queens." How or when these fertile workers are impregnated is quite unknown.

Fertile workers resemble queens whose impregnation has been retarded, in this, that they lay the eggs of drones only, never those of workers; and also in this, that they sometimes place their eggs in royal cells. It is remarkable, however, that in the case of queens, whose impregnation has been retarded, laying their eggs in royal cells, the bees build them up, and brood over them until the last metamorphosis of the included drones; but that when eggs are deposited in royal cells by fertile workers, the bees, although at first they pay due attention to the larvæ, never fail to destroy them in the course of a few days.

Schirach's discoveries certainly proved, that common working bees are radically of the female sex. Huber, we have seen, detected and described their ovaries; and the notion, long entertained, of their being of the *neuter* gender, is now justly exploded as a solecism in animated nature. Here, we cannot help observing, that the doctrine of workers being of the female sex, has accidentally, and most unintentionally, received a very striking collateral confirmation from one of its most eminent opposers. Linnæus had asserted* that there are ten joints in the antennæ of queens; eleven in those of drones; and fifteen in those of workers: and his assertion on this point naturally passed current as authentick fact. Taking it for granted, therefore, that there existed such a discrepancy in the structure of the antennæ of queens and of workers, naturalists were startled at the new doctrine, that both were

* Systema Naturæ, art. Apis mellifica. "Regina (fœmina) antennis articulis 10, &c. Fuci (mares) antennis 11-articulatis, &c. perariæ (spadones) antennis 15-articulatis, &c."

females, and that the larvæ of workers could be converted into queens. Mr. Kirby (the acute and laborious author of the *Monographia Apum Angliæ*, in which he has described above 220 species, natives of England) has corrected the Swedish knight, and informs us, that there are positively the same number of articulations in the antennæ of queens, as in those of workers. This testimony is not the less deserving of credit, that it militates against Mr. Kirby's own notions, who continues to argue for workers being proper neuters.

M. Huber imagines he has discovered the cause of the partial expansion of the sexual organs in those workers that prove fertile. He observes, that fertile workers appear in those hives only that have lost the queen, and where, of course, a quantity of royal jelly is prepared for feeding the larvæ intended to replace her. He suspects that the bees, either by accident, or by a particular instinct, the principle of which is unknown, drop some particles of royal jelly into cells, contiguous to those containing the worms destined for queens. The larvæ of workers that thus casually receive portions of this active aliment, are affected by it, and their ovaries acquire a certain degree of expansion. From the want of full feeding, and owing to the smallness of their cells, this expansion is only partial, and such fertile workers remain of the ordinary size of working bees, and lay only a few eggs. The royal jelly, when pure, may be known by its pungent taste;* but when mixed with other substances, it is not easily distinguished. M. Huber repeatedly tried to feed some of the larvæ of workers in other parts of the hive, with the royal jelly, in order to observe the consequences; but he found this to be a vain attempt, the bees immediately destroying such worms, and themselves devouring the food. It has not, therefore, been directly ascertained, that all fertile workers proceed from larvæ that have received portions of the royal food; but M. Huber observed, that they were uniformly such as had passed the vermicular state, in cells contiguous to the royal ones. "The bees," he remarks, "in their course thither, will pass in numbers over them, stop, and drop some portion of the jelly destined for the royal larvæ." This reasoning, though not conclusive, is plausible. The result is so uniform, that M. Huber says he can, whenever he pleases, produce fertile workers in his hives. They are, probably, he adds, always produced, in greater or less numbers, whenever the bees have to create to themselves a new queen. And the reason that they are so seldom seen, probably is, that the queen bees attack and destroy them without mercy whenever they perceive them.

Letters sixth and seventh, treat of the combats of queens; the massacre of the males; and of the reception a stranger queen meets with in a hive. When a supernumerary queen is produced in a hive, or is introduced into it in the course of experiment, either she or the rightful owner soon perishes. The German naturalists, Schirach and Riems, imagined that the working bees assailed the stranger, and stung her to death. Réaumeur considered it as more probable, that the sceptre was made to depend on the issue of a single combat between the claimants; and this conjecture is verified by the observations of Huber. The same hostility towards rivals, and destructive vengeance against royal cells, animates all queens, whether they be vir-

* Mr. Bonner puzzles much about this royal jelly, whether it be of a *generative* or a *nutritive* nature. He inclines to the former opinion, while he at the same time admits, that in this case we must take it for granted that the working bees are males! But this difficulty he pleasantly enough considers as counterbalanced by one on the other side; for if the jelly be merely of a nutritive nature, then, says he, the queen is self-prolifick, or a hermophrodite!

gins, or in a state of impregnation, or the mothers of numerous broods. The working bees, it may here be remarked, remain quiet spectators of the destruction, by the first hatched queen, of the remaining royal cells. They approach only to share in the plunder presented by their havock-making mistress, greedily devouring any food found at the bottom of the cells, and even sucking the fluid from the abdomen of the nymphs before they toss out the carcases.

The following fact, connected with this subject, is one of the most curious, perhaps, in the whole history of this wonderful insect. Whenever the workers perceive that there are two rival queens in the hive, numbers of them crowd around each. They seem to be perfectly aware of the approaching deadly conflict, and willing to prompt their amazonian chieftains to the battle; for, as often as the queens show a disinclination to fight, or seem inclined to recede from each other, or to fly off, the bees immediately surround and detain them; but when either combatant shows a disposition to approach her antagonist, all the bees forming the clusters instantly give way to allow her full liberty for the attack. p. 117. It seems strange that those bees who in general show so much anxiety about the safety of their queen, should, in particular circumstances, oppose her preparations to avoid impending danger,—should seem to promote the battle, and to excite the fury of the combatants.

When a queen is removed from a hive, the bees do not immediately perceive it. They continue their labours; "watch over the young; and perform all their ordinary occupations. But, in a few hours, agitation ensues; all appears a scene of tumult in the hive. A singular humming is heard; the bees desert their young; and rush over the surface of the combs with a delirious impetuosity." They have now evidently discovered that their sovereign is gone; and the rapidity with which the bad news now spreads through the hive, to the opposite side of the combs, is very remarkable. On replacing the queen in the hive, tranquillity is almost instantly restored. The bees, it is worthy of notice, recognise the individual person of their own queen. If another be palmed upon them, they seize and surround her, so that she is either suffocated or perishes by hunger; for it is very remarkable, that the workers are never known to attack a queen bee with their stings. If, however, more than eighteen hours have elapsed before the stranger queen be introduced, she has some chance to escape. The bees do at first seize and confine her; but less rigidly; and they soon begin to disperse, and at length leave her to reign over a hive in which she was at first treated as a prisoner. If twenty-four hours have elapsed, the stranger will be well received from the first, and at once admitted to the sovereignty of the hive. In short, it appears that the bees, when deprived of their queen, are thrown into great agitation; that they wait about twenty hours, apparently in hopes of her return; but that after this interregnum, the agitation ceases; and they set about supplying their loss by beginning to construct royal cells. It is when they are in this temper, and not sooner, that a stranger queen will be graciously received: and upon her being presented to them, the royal cells, in whatever state of forwardness they may happen to be, are instantly abandoned, and the larvæ destroyed. Réaumeur must, therefore, have mistaken the result of his own experiments, when he asserts, that a stranger queen is instantly well received, though presented at the moment when the other is withdrawn. He had seen the bees crowding around her at the entrance of the hive, and laying their antennæ over her; and this he seems to have taken for caressing. The structure of the hives he employed, prevented him from seeing further. Had he used the leaf-hive,

or one of similar construction, he would have perceived that the apparent caresses of the guards were only the prelude of actual imprisonment.

It is well known that after the season of swarming, a general massacre of the drones is commenced. Several authors assert in their writings, that the workers do not sting the drones to death, but merely harass them till they be banished from the hive and perish. M. Huber contrived a glass table, on which he placed several hives, and he was thus able to see distinctly what passed in the bottom of the hive, which is generally dark and concealed. He witnessed a real and furious massacre of the males, the workers thrusting their stings so deep into the bodies of the defenceless drones, that they were obliged to turn on themselves as on a pivot, before they could extricate them. The work of death commenced in all the hives much about the same time. It is not, however, by a blind or indiscriminating instinct that the workers are impelled thus to sacrifice the males; for if a hive be deprived of its queen, no massacre of the males takes place in it, while the hottest persecution rages in all the surrounding hives. In this case, the males are allowed to survive over winter. Mr. Bonner had observed this fact. He supposed, however, that the workers thus tolerated the drones for the sake of the additional heat they generated in the hive; but we now see the true reason to be, that their aid is needed to impregnate a new queen. The drones are also suffered to exist in hives that possess fertile workers, but no proper queen; and, what is remarkable, they are likewise spared in hives governed by a queen whose impregnation has been retarded. Here, then, we perceive a counter instinct opposed to that which would have impelled them to the usual massacre.

Letter eighth is occupied with miscellaneous topicks. The author first investigates whether the queen be really oviparous; and this point he clearly ascertains in the affirmative.

He next states the different periods at which the transformations occur, in the case of the different orders of queen, worker, and drone; and his information being minute, and no doubt correctly accurate, we shall extract it.

The worm of workers passes three days in the egg; five in the vermicular state; and then the bees close up its cell with a wax covering. The worm now begins spinning its coccoon, in which operation thirty-six hours are consumed. In three days it changes to a nymph, and it passes six days in this form. It is only on the twentieth day of its existence, counting from the moment the egg is laid, that it attains the fly state.—The royal worm also passes three days in the egg, and is five a worm. The bees then close its cell, and it immediately begins spinning the coccoon, which occupies twenty-four hours. The tenth and eleventh day it remains in complete repose, and even sixteen hours of the twelfth. Then the transformation to a nymph takes place, in which state four and one-third days are passed. Thus, it is not before the sixteenth day that the perfect state of queen is attained.—The male worm passes three days in the egg, six and a half as a worm, and metamorphoses into a fly on the twenty-fourth day after the egg is laid. p. 151—152.

The author then examines the effects of position on the growth of the larvæ. The bodies of the larvæ, in the cells of workers and drones, are placed perpendicular to the horizon. Those in royal cells lie horizontally. It was suspected that the horizontal posture somehow promoted the increment of the royal grub; but M. Huber found, that a complete reversal of the position was followed by no perceptible consequence to the larvæ.

We have, in the next place, some remarks on the coccoons spun by the different larvæ. Workers and drones both spin complete coccoons, or enclose themselves on every side. Royal larvæ, however, construct only imperfect coccoons, open behind, and enveloping only the head, thorax, and first ring of the abdomen. M Huber concludes, without any hesitation, that the final cause of the royal larvæ forming only incomplete coccoons, is,

that they may thus be exposed to the mortal sting of the first-hatched queen, whose instinct leads her instantly to seek the destruction of those that would soon become her rivals; and he calls upon us to admire the providence of Nature, in thus exposing the royal larvæ to fatal danger. p. 159

In the close of the letter, we have an account of an experiment instituted to determine the influence which the size of the cells might have on the size of the bees produced in them. All the larvæ were removed from a comb of drones' cells, and the larvæ of workers substituted in their place. The bees, it may be remarked, immediately showed that they were aware of the change which had been effected; for they did not close the cells with the convex covering always placed over the males, but gave them quite a flat top. The result proved that the size of the cells does not materially influence the size of the bees; or, at least, that although a small cell may cramp the size of a worker, yet, that workers bred in large cells do not exceed the ordinary bulk.

In letters ninth, tenth, and eleventh, the author treats of the formation of swarms. But in the first place, he gives an interesting account of the hatching of the queen bee. When the pupa is about to change into the perfect insect, the bees render the cover of the cell thinner by gnawing away part of the wax; and with so much nicety do they perform this operation, that the cover at last becomes pellucid, owing to its extreme thinness. This must not only facilitate the exit of the fly, but, M. Huber remarks, it may possibly be useful in permitting the evaporation of the superabundant fluids of the nymph. After the transformation is complete, the young queens would, in common course, immediately emerge from their cells, as workers and drones do; but the bees always keep them prisoners for some days in their cells, supplying them in the mean time with honey for food; a small hole being made in the door of each cell, through which the confined bee extends its proboscis to receive it. The royal prisoners continually utter a kind of song, the modulations of which are said to vary. The final cause of this temporary imprisonment, it is suggested, may possibly be, that they may be able to take flight, at the instant they are liberated. When a young queen does at last get out, she meets with rather an awkward reception. She is pulled, bit, and chased, as often as she happens to approach the other royal cells in the hive. The purpose of nature here seems to be, that she should be impelled to go off with a swarm as soon as possible. A curious fact was observed on these occasions. When the queen found herself much harassed, she had only to utter a peculiar noise (the commanding voice, we may presume, of sovereignty) and all the bees were instantaneously constrained to submission and obedience. This is, indeed, one of the most marked instances in which the queen exerts her sovereign power. It seems entirely to have escaped the notice of Mr. Bonner, who declares that he never could observe in the queen any thing like an exertion of sovereignty.*

The conclusions at which M. Huber arrives on the subject of swarms, are the following.

1*st*, "A swarm is always led off by a single queen, either the sovereign of the parent hive, or one recently brought into existence. If, at the return of spring, we examine a hive well peopled, and governed by a fertile queen, we shall see her lay a prodigious number of male eggs in the course of May, and the workers will choose that moment for constructing several royal cells." p. 202. This laying of male eggs in May, M. Huber calls the *great*

* Bonner on Bees, p. 52.

laying; and he remarks, that no queen ever has a great laying till she be eleven months old. It is only after finishing this laying, that she is able to undertake the journey implied in leading a swarm; for, previously to this, "*atum trahit alvum,*" which unfits her for flying. There appears to be a secret relation between the production of male eggs and the construction of royal cells. The great laying commonly lasts thirty days: and regularly on the twentieth or twenty-first, several royal cells are founded.

2*dly*, "When the larvæ hatched from the eggs laid by the queen in the royal cells are ready to transform to nymphs, this queen leaves the hive, conducting a swarm along with her; and the first swarm that proceeds from the hive is uniformly conducted by the old queen." p. 205. M. Huber remarks, that it was necessary that instinct should impel the old queen to lead forth the first swarm; for that she being the strongest, would never have failed to have overthrown the younger competitors for the throne. An old queen, as has been already said, never quits a hive at the head of a swarm, till she have finished her laying of male eggs; but this is of importance, not merely that she may be lighter and fitter for flight, but that she may be ready to begin with the laying of workers' eggs in her new habitation, workers being the bees first needed in order to secure the continuance and prosperity of the newly founded commonwealth.

3*dly*, "After the old queen has conducted the first swarm from the hive, the remaining bees take particular care of the royal cells, and prevent the young queens successively hatched, from leaving them, unless at an interval of several days between each." p. 207. Under this head, he introduces a number of general remarks, some of which may prove useful. "A swarm, he observes, is never seen, unless in a fine day; or, to speak more correctly, at a time of the day when the sun shines, and the air is calm. Sometimes we have observed all the precursors of swarming, disorder and agitation; but a cloud passed before the sun, and tranquillity was restored; the bees thought no more of swarming. An hour afterwards, the sun having again appeared, the tumult was renewed; it rapidly augmented; and the swarm departed." p. 211. A certain degree of tumult commences as soon as the young queens are hatched, and begin to traverse the hive. The agitation soon pervades the whole bees; and such a ferment then rages, that M. Huber has often observed the thermometer in the hive rise suddenly from about 92° to above 104°. This suffocating heat he considers as one of the means employed by nature for urging the bees to go off in swarms. In warm weather, one strong hive has been known to send off four swarms in eighteen days.

4*thly*, "The young queens conducting swarms from their native hive, are still in a virgin state." p. 221. The day after being settled in their new abode, they generally set out in quest of the males, and this is usually the fifth day of their existence as queens. Old queens conducting the first swarms require no renewal of their intercourse with the male, a single interview being sufficient to fecundate all the eggs that a queen will lay for at least two years. This is considered by Mr. Bonner as quite an incredible circumstance; insomuch that he remarks, either in a sarcastick, or in a very innocent style, that if a queen bee "should continue for seven or eight months with about 12,000 impregnated eggs in her ovarium, it certainly would make her appear very large!"* The worthy bee master seems to have fancied that an egg could not be fecundated till it were of the full size, and ready for exclusion. It is a fact, however, ascertained beyond contro-

* Bonner on Bees, p. 69.

versy by M. Huber, that "a single copulation is sufficient to impregnate the whole eggs that a queen will lay in the course of at least two years. I have even reason to think, he adds, that a single copulation will impregnate all the eggs that she will lay during her whole life; but I want absolute proof for more than two years." p. 54.

Towards the close of the eleventh letter, we have some remarks on the wonderful instincts of bees; and in hazarding these, M. Huber is duly cautious. He resolves all into what Shakspeare calls a "ruling nature;" and disapproves both of Réaumeur for ascribing wisdom and foresight to them, and of Buffon for considering them as mere automata. We do not imagine he would be at all more indulgent to our learned countryman Mr. Knight, who, in a late paper on the economy of bees,* has intimated his belief that they can hold consultations, and communicate different kinds of intelligence to each other. "If their language," he goes the length of saying, "be not in some degree a language of ideas, it appears to be something very similar."

In the twelfth letter, we find additional observations on queens that lay only the eggs of drones, or whose fecundation has been retarded. The instinct of such queens seems to be impaired. They show no antipathy to royal cells, but pass quietly over them without indicating any emotion; while other queens exhibit the greatest enmity against those of their own sex that are in the nymphine state. Some observations are added on the effects produced by mutilating the bodies of queens. Swammerdam had asserted, that if the wings of queens be cut, they are rendered sterile. This appeared rather strange and improbable. M. Huber accordingly found, that the cutting of the wings of impregnated queens produced no effect on them; and he concludes, certainly with great probability, that Swammerdam had cut the wings of virgin queens, who had not therefore been able to seek the males in the air, and so remained barren. The amputation of one antenna, M. Huber found, had no bad effect on a queen; but when deprived of both, she was much deranged. She dropped her eggs at random; and when the bees fed her, she often missed her aim in attempting to catch hold of the morsel they presented to her. M. Huber placed two queens deprived of the antennæ in the same hive. The loss of their feelers seemed to have put an end to their natural animosity. They passed and repassed each other, without taking the least notice. Both of them constantly endeavoured to leave the hive. M. Huber declares that he cannot say whether the antennæ be the organs of touch or smell; but he suggests that they may possibly fulfil both functions at once. It seems fully as probable that they are the instruments of a peculiar sense, of the nature of which we have no conception, and for which, consequently, we have no name.

In the thirteenth and last letter, we have several useful observations on the economical treatment of bees. It has already been hinted, that M. Huber's leaf-hive might be employed with advantage by practical men. It is well calculated, for example, for producing artificial swarms, on the principle of Schirach's discovery. "In the leaf-hive we can see whether the population is sufficient to admit of division,—if the brood is of proper age,—if males exist or are ready to be produced for impregnating the young queen." By means of it, also, bees may be induced to work much more in wax than they would naturally do. "Here, says M. Huber, I am led to what I believe is a new observation. While naturalists have directed our admiration to the parallel position of the combs, they have overlooked another trait in the industry of bees, namely, the equal distance uniformly be-

* Phil. Trans. 1807, part ii.

tween them. On measuring the interval separating the combs, it will generally be found about four lines. Were they too distant, it is very evident the bees would be much dispersed, and unable to communicate their heat reciprocally; whence the brood would not be exposed to sufficient warmth. Were the combs too close, on the contrary, the bees could not freely traverse the intervals, and the work of the hive would suffer." p 263. This instinct being admitted, it is evident that bees may he induced to construct new combs, by merely separating those already built, so far asunder, that they may have room to build others in the interval.

The cause of the bees, which has been so eloquently and pathetically pleaded by the poet of the Seasons, is supported by M. Huber on a principle more intelligible, perhaps, and more persuasive, to most country bee masters,—*viz.* interest. He deprecates the destruction of bees, and recommends to the cultivator to be content with a reasonable share of the wealth of the hive; arguing, very justly we believe, that a little taken from each of a number of hives, is ultimately much more profitable, than a greater quantity obtained by the total destruction of a few.

M. Huber, in the conclusion, promises to give to the publick a separate work on the economical management of bees. This has not yet been published; but the experience and sagacity of the author lead us to anticipate in it, the most useful, practical book that has ever appeared on the subject. We may observe, however, that to the edition printed at Paris in 1796 is subjoined a "Manuel-pratique de la Culture des Abeilles," by a Frenchman. This little tract contains, in our opinion, a good deal of useful information, exhibiting the most recent and improved plans adopted in France. A translation of it, we conceive, would have been a valuable addition to the work now before us.

Upon the whole, M. Huber's treatise is both an entertaining and an instructive little volume. Throughout the performance, however, a want of arrangement is conspicuous; and in this respect the original is still more faulty than the translation; for the translator has, with propriety, removed to an appendix some minute anatomical details, which interrupt and darken the narrative; and has, on the other hand, engrossed in the text some important and closely connected passages which are improperly thrown into foot notes in the original.

The author mentions in his preface, that he had long been deprived of sight, and was obliged to depend on an assistant in making his experiments. We should not wonder if the reader should agree with us in being at first somewhat mortified at this intelligence, and should wish that the author had seen every thing with his own eyes. We should really be surprised if he did not smile with us at finding this untoward looking circumstance actually considered as an advantage by the translator; for, after mentioning the circumstance, the translator, in his preface, immediately adds: "Thus these discoveries may be said to acquire double authority!" Now, it seems pretty evident, that though a naturalist's assistant may possess a pair of very good eyes, he may yet be quite inadequate to the task of intelligibly describing what he sees. M. Huber, however, fortunately enjoyed in *Francis Burnens*, a philosophick assistant, who himself appears to have entered with enthusiasm into the pursuit, and to have conducted the experiments, not only with the most patient assiduity, watching every occurrence *oculis emissitiis*, but with great address, and no small share of steadiness and courage—qualities indispensable in those who attempt to work among the stinging nations.

In respect to the translation, it is anonymous; but bears intrinsick marks of Scottish extraction. In his preface, the translator observes: "It is vain to attempt a translation of any work without being, to a certain degree, skilled in the subject of which it treats. Some parts of the original of the following treatise, it must be acknowledged, are confused, and some so minute, that it is extremely difficult to give an exact interpretation. But the general tenour, though not elegant, is plain and perspicuous; and such has it been here retained." We should be sorry to detract from this modest claim. The translation is certainly always plain, and it is generally perspicuous. The extracts we have given may be considered as affording a fair specimen of the whole. We must not conceal, however, that in some few instances it is careless and faulty. The sense is entirely mistaken at page 112; and at page 23 inextricable confusion is produced by his choosing to render, "reigning queens" by the extraordinary phrase of "virgin females." Upon the whole, however, the translation is better than that of most French books.

As Mr. Bonner's treatise is pretty well known, and his opinions generally circulated, especially in Scotland, we have thought it not amiss, in the course of the preceding analysis, to state the chief points in which M. Huber differs from him; and we confess that it has appeared to us that in these cases our countryman generally stands corrected by the Genevese observer. They appear both to have been engaged in making their experiments and observations about the same time, from 1788 to 1791. M. Huber, however, possessed several eminent advantages. He was directed in his researches by one of the first philosophers of the day, M. Bonnet. He was not restrained in his experiments by any considerations of time or expense; and he was aided by an assistant peculiarly expert in working among bees. Our Bonner, on the other hand, was so much restricted, both as to expense and time, having a family to support by his daily earnings at the loom; and he long laboured under a very peculiar and almost incredible disadvantage,—that of residing in the midst of a populous city; for we understand it to be a fact, that his apiary was for some years kept in a *garret* in Glasgow.

The practical directions contained in Mr. Bonner's book, are, we have no doubt, in general excellent; but many of them are of partial application only, being peculiarly adapted to the climate of North Britain; and it must not be concealed, that this climate is unfavourable to the cultivation of bees. In this respect, it is inferiour, not only to the climate of France or Italy, but even to that of Denmark or Russia; for in these last countries, the bees remain, during the whole winter, in a state approaching to torpor, and never leave their hives till the frost has fairly broken up, when, as is well known, the genial season immediately commences, and continues steady for several months. With us, on the contrary, the great changeableness of the weather in the months of March, April, and May, opposes an almost insurmountable obstacle to that extensive culture of those insects, so enthusiastically projected by the worthy bee master; and if we be not misinformed, the issue of some pretty extensive trials made by the author himself, under the patronage of the indefatigable president of the Board of Agriculture (sir John Sinclair) has not much tended to encourage those high expectations.

FROM THE EDINBURGH REVIEW.

Notice de la Vie et des Ecrits de George Louis Le Sage de Geneve, Membre de l'Academie et de l'Institut de Bologne, &c. &c. Redigée après ses Notes, par Pierre Prevost. A Geneve, chez Paschoud.

THE biographical sketch here announced, has more than an ordinary claim to the attention of the reader. The subject of it is a philosopher, who, beside the peculiarities incident to genius, had several that belonged exclusively to himself. These he was careful to study and explain; and the notes which he has left behind him, seem to entitle him to the rare eulogy, of having given an accurate and candid delineation of his own character. His biographer, too, had the advantage of being intimately acquainted with the person whom he has undertaken to describe, and has been attentive to mark whatever appeared singular in the constitution or progress of his mind.

George Lewis Le Sage was born at Geneva in 1724, to which city his father, a native of France, had for some time retired, and lived by giving private lessons in mathematicks and natural philosophy. The son was early initiated in these studies; receiving, at the same time, in all the branches of literature, as liberal a course of education as his father's limited income would allow. A marked opposition, however, in their tastes and intellectual propensities, prevented the son from reaping, from his father's instructions, all the advantages that might have been expected. The old man was well informed; but his knowledge was very much confined to facts, and was accompanied with little tendency to reason or to generalize. His son, again, even when a boy, delighted in connecting his ideas by general and abstract principles, and was not more inquisitive about facts, than about the relations in which they stood to one other. This propensity arose, in some measure at least, from the weakness of his memory, which forced him to study the most just and constant connexions among things, in order to prevent both words and ideas from escaping his recollection entirely. "It was thus," says M. Prevost, "that we saw him, in his maturer years, and particularly in his old age, avoiding, with the greatest care, whatever could trouble the order of his thoughts, and substituting, with much art, a logical series of mental operations to the effort which the recollection of a single unconnected fact would necessarily have cost him."

The history of Le Sage does, indeed, illustrate, in the clearest manner, the relation between the faculties of memory and abstraction, and the power which each has to supply the deficiencies of the other. Generalization gives us a command over our ideas more complete than we can ever derive from the mere efforts of memory. It holds in its hand the clue by which this latter faculty must be guided through the labyrinth of things; and there is room to doubt, whether the power thus given to the mind is not the main source of the delight arising from abstract and philosophick speculation. Were the memory in itself to become so perfect, as to be independent of connecting principles, generalization would not be necessary, and perhaps would rarely be attempted.

Two minds, both disposed to the acquisition of knowledge, could hardly be constituted with less conformity to one another, than those of Le Sage and his son. When the young man was labouring to classify his ideas, and to reduce them under general heads, the father was perpetually starting objections to his rules, and bringing forward the instances most difficult to be reduced to any general principle of arrangement. This seemed to proceed, not from any desire to embarrass or distress his son, but from a dislike which he had conceived (singular, doubtless, in a mathematician) to general me-

thods, and to all systems whatsoever. The education, therefore, which he gave his son, was truly antiphilosophick, and certainly had no tendency to produce that love of order, system, and method, which characterized him through his whole life. But the mind may be constituted with some powers so weak, that discipline cannot improve them; and with others so strong, that discipline, when most perverse, cannot destroy them. Nothing could give to young Le Sage a memory nearly equal to that of ordinary men; and nothing could take from him a delight and skill in generalization, which were vastly superiour.

We must not imagine from this, that the whole plan of the old man, in the education of his son, was as perverse as in the case here mentioned. The information he communicated, even with so little of method and arrangement to connect the parts together, was of great value to his son, who, through his whole life, used to speak with much gratitude of his father's attention to his instruction, and of the pleasure and advantage he derived from his conversation.

The inquisitive turn of Le Sage soon displayed itself in questions, to which he did not always receive the kindest or most satisfactory answers, especially from his mother, who appears to have had none of the gentleness and patience necessary for the instruction of children. This led him to think of having recourse to trial and experience, and to interrogate nature rather than any other instructer. One of his first attempts of this sort has been recorded in his notes, and, from the singularity of it deserves to be remembered.

At the time we are now speaking of, the Sabbath was observed at Geneva, with a gloom and austerity of which we, in Scotland, can probably form a more correct notion than the inhabitants of any other country in Christendom. Le Sage felt some curiosity to know whether the Author of Nature still continued to impose on himself the same law that originally marked the institution of the *day of rest*. It would have puzzled the first philosopher in Europe to think of any method by which this question could be brought to the decision of experiment; but the ingenuity of our young inquirer soon suggested an expedient. He measured, with great care, the increase of a plant, day after day, in order to discover whether it would cease growing on the Sabbath. The result could not fail to solve the difficulty, and to convince the young man, that though the work of creation might terminate, the work of Providence is never interrupted.

The pensive and contemplative turn of Le Sage was increased by the circumstance of his health being delicate, and his temperament too weak, to allow him to join in the fatiguing exercises which amused and occupied his companions. Great modesty, sensibility, and reserve, added, as far as his mother was concerned, to the want of comfortable society at home, condemned him almost to continual solitude, and rendered the acquisition of knowledge his only enjoyment. Thus, from circumstances apparently unfortunate, much of his intellectual excellence may be supposed to have arisen.

It is material to observe every circumstance that gave a determination to a mind that has in any thing attained celebrity; but it is very rarely that this can be done so well as in the instance we have now before us. The father of our young philosopher had but few books; and almost the only entire work on physicks, which he possessed, was that of Bernard Palissy. The writings of a man who was self-instructed; who had paid no regard to authority, when not supported by experience; who had made valuable discoveries, and reached some very sublime and just notions concerning the

structure and the revolutions of the globe, could not fail to make a strong impression on a young mind already inspired by the love of knowledge. However, though Le Sage became a great cosmologist, it does not appear that geology, of which Palissy was in some measure the founder, ever attracted much of his attention.

When he was not much more than thirteen, his father put into his hands the *Antiquité Expliquée* of Montfaucon, in order to excite in him a curiosity about researches into antiquity. It was the fate of this young man, however, to derive, from the means used for his instruction, advantages very different from those that were intended, and often of far greater value. The weakness of Montfaucon's conjectures, concerning the use of many of the instruments he has described, did not escape the observation of Le Sage; and he began, even then, to try to establish some general and certain rules for discovering the end of a workman from the inspection of his work. Such extent of view, at so early a period of life, has rarely occurred, and must be considered as a decided mark of genius and originality. Some years after this period, connecting the pursuit just mentioned with one closely allied to it, namely, the rules that must guide us when in the works of nature, we would trace the marks of the wise design of the Creator, he formed the idea of a treatise, entitled Teleology, and of which an account will afterwards be given.

The perusal of Lucretius is one of the events that did most determine the objects of Le Sage's researches, and, indeed, the whole colour and complexion of his future speculations. The precise time when this happened does not appear, though it was certainly very early, and before he had attained the age of twenty. It was then that he conceived the notion of a mechanical explanation of gravity, and of the reduction of all the motions observed in nature, to the principle of impulsion. This was suggested by the atoms of Lucretius; and the invention of a system by which such an explanation could be given, even with tolerable plausibility, must be considered as a work of great merit by all who know the difficulty with which it is attended, and its importance to philosophy. The system by which Le Sage proposed to effect this great object will be by and by considered.

Le Sage had the good fortune to study mathematicks under Cramer, and philosophy under Calendrini, two eminent professors who then adorned the university of Geneva. When it became necessary for him to make choice of a profession, he gave the preference to that of medicine. The pursuit of this study led him first to Basle, and afterwards to Paris. At the former place, he became acquainted with Daniel Bernoulli, from whom, however, his merit seems to have been completely concealed, by his awkwardness and diffidence. He says of himself, when he entered at this university—"Ill dressed, timid, and expressing myself with difficulty, I was quite neglected in the first months of my stay at Basle; insomuch, that they did not even think it worth while to speak French before me." He undertook the study of the German; but the weakness of his memory did not permit him to succeed.

The same awkwardness could not fail to have effects at Paris yet more unfavourable, as the narrowness of his income must likewise have had; yet he persevered, not only in pursuing medicine, but in applying to his favourite objects in philosophy. At last he returned to Geneva; but not having the freedom of a burgess of the city, he was refused the privilege of practising as a physician; and saw himself, in the end, forced to relinquish every other view of fixing himself in life, but that of following the business of his father, and giving lessons in mathematicks and natural philosophy.

For this he appears to have been well qualified. He says of himself, that the structure of his mind was such, as had fitted him for understanding the mathematicks *well*, but not *extensively*. "Propre à bien savoir les mathematiques, mais non a en savoir beaucoup." The first part of this assertion, we imagine, may be understood more literally than the last; though it is probably true that he was not quite master of all the modern improvements of the *calculus*. Some of his remarks on the state of the mathematical sciences in France are worth attending to. In a letter to the duke de Rochefoucault, whom he had had the honour to instruct in the mathematicks, dated in 1778, he has this observation.

In their elementary treatises of mathematicks and physicks, the French writers take so little trouble about the foundations of those calculations which they accumulate without end, that it seems as if they wanted to make all their pupils mere clerks in a banking house, or assistants in an observatory. They treat geometry the least geometrically possible, under the pretence that algebraick demonstrations are the shortest: as if the only object were to get to the end, and as if the road leading to it were of no importance. They are in haste to give a few notions, rather grammatical than intellectual, of the sublimer parts, before they have sufficiently developed the elements. They seem desirous of reducing astronomy, the science of motion, and chymistry, to be nothing but the humble attendants on navigation, gunnery, and the arts; as if all the world was destined for inspectors of the marine, of artillery, or manufactures; and as if the cultivation of reason was nothing in comparison with the art of getting wealth. This was not the proceeding of Descartes or Newton. p. 272.

This character of the French elementary writers, though, in certain respects, just, evidently has something of the air of satire, and must not be received as perfectly correct. Of too little regard to the methods of pure geometry, and too much haste to reach the more profound parts of the calculus, they may certainly be accused. But a general preference of the methods of algebra and analysis, cannot be regarded as an errour, if the foundations of those methods are carefully and accurately explained. Analytical reasonings are so much preferable to synthetical, and the art of investigation is so much more easily learned in the school of algebra than in any other, that, in a system of mathematical instruction, this latter science is undoubtedly of the first consideration. It is true, on the other hand, that the methods of analysis are not confined to algebra. Geometry has its analytical reasonings, not so extensive, nor so general, as those of algebra, but possessing a degree of simplicity and beauty that is not excelled, or rather, we think, not equalled in any other branch of science. It is a stronger proof of the neglect of geometry, among the French mathematicians, than any thing that Le Sage has alleged, that in the *Encyclopedie*, intended to exhibit a complete picture of the knowledge of the eighteenth century, the article *geometrical analysis* is not to be found.

The love of accurate and precise knowledge, which Le Sage possessed eminently, probably qualified him well for a teacher of the mathematical sciences. He had several illustrious pupils, and none, certainly, who does him more credit than the present professor of mathematicks in the university of Geneva. M. S. L'Huilier was his relation, and was instructed by him in the science which he now professes with so much credit both to his master and himself. He is one of the few mathematicians equally versed in the simple and elegant methods of the ancient geometry, and in the profound researches of the modern analysis.

Le Sage, through his whole life, had to struggle with a feeble constitution, as well as the mental defects which have been already mentioned. He was particularly afflicted with sleeplessness, which, at times, used greatly to affect his intellectual powers, and reduce them to a state of extreme debility. Notwithstanding this, by employing every moment, when his mind was

clear and active, preserving such order and regularity as supplied the want of memory, committing every thing to writing, and having his papers in a state of the most complete arrangement, he was able to accomplish a great deal, and to devote much time to philosophical pursuits.

His studies, however, were rendered less useful than they might have been with the originality of his turn of thinking, the precision of his knowledge, and the extent of his views, by the number of objects to which he directed his attention, and by his frequent changes from one pursuit to another. Though he came back easily to the same object, yet this did not entirely make up for the want of the continued application necessary in all great undertakings.

Accordingly, though few men wrote so much, and so accurately, he published nothing in his lifetime but mere *opuscula*, and has left few, if any, of his numerous manuscripts completely ready for the press.

One of the principal pieces which appeared in his lifetime, shared the prize proposed by the academy of Dijon, in 1758, on the cause of chymical affinities. He entitled it, *Essai de Chimie Mechanique*, and endeavoured to explain the whole of chymical action on the principle of impulse. He supposed the impelling fluid to be composed of particles of two kinds; the one greater, and the other less: and he demonstrated, in virtue of that single supposition, that homogeneous bodies must attract one another more than heterogeneous. This, however, it must be confessed, comprehends but a small part of the phenomena of chymistry. It was connected with the work on gravity, which was the great business, and the favourite occupation of his life.

An essay, "*Sur les Forces Mortes*," which he sent to the academy of sciences at Paris, was never published.

In the history of the same academy for 1756, a remark is inserted from Le Sage, containing the detection of an errour committed by Euclid, in the eleventh book of his Elements, on the subject of solid angles. It is remarkable, that nearly about the same time, Dr. Simpson, of Glasgow, made a similar detection, with respect to the manner in which equal solids are treated by the Greek geometer.

The tract, entitled "*Lucrece Nutonien*," was published in the Berlin Memoirs for 1782.

Besides these, he published a few other occasional pieces, and seems to have kept up a pretty extensive correspondence with several of the first philosophers of the age. His manuscripts are, a large treatise "*Sur les Corpusculus Ultramondains;*" subordinate to which is "*Histoire Critique de la Pesanteur.*" This contains much learning, and treats of all the notions that have been entertained on the subject of gravity, and all the theories contrived for explaining it. A treatise on cohesion, intended to show that it cannot be explained by the Newtonian attraction, is recommended by M. Prevost as a work of great merit, written during the full activity and vigour of the author's mind.

To these must be added the following: on elastick fluids; on general physicks; on logick; on moral philosophy; and on final causes: also, *Melanges Dystactiques*, &c. Among the latter was an Essay on Punctuation, concerning which he had a system of his own. To this system he adhered rigidly; and it is said to be very philosophical; but, perhaps, for that very reason, it has never come into use.

It may be thought extraordinary, that so much should have been done, and yet so little completed. The habit of continually amassing materials, without reducing them into form, had grown on Le Sage to an excessive

degree; and he used to apologize for it by saying, "that as long as he could find any thing new to put on paper, he grudged the time that must be employed in polishing old materials, or casting them over again."

The ingenuity of his mind, and the original turn of his thoughts, added to a character of great probity and worth, procured him esteem and respect wherever he was known. M. Pervost has given extracts from a number of very interesting letters, which passed between him and several of the most distinguished persons of the age. Among these are Madame Necker, the Dutchess d'Enville, earl Stanhope, the Duke de Rochefoucault, M. M. d'Alembert. Euler, Turgot, Boscovich, Lambert, &c.

Though his constitution was originally weak, and his health always infirm, he reached the age of eighty, and died in 1803. His biographer has given a sketch of his intellectual character, from which we shall extract a few passages.

It is impossible not to recognise, in the works of Le Sage, and his manner of thinking, a strong character of originality; and, if a cautious and regulated invention be characteristick of genius, this philosopher must be numbered with those whom nature has particularly distinguished. All who knew him were at the same time sensible of his peculiarities, which he himself did not, indeed, attempt to conceal, but endeavoured to explain. He acknowledged that two of his faculties were weak—attention and memory. He was unable to fix the former on one object for any considerable length of time; and, as he could not attend, without great difficulty, to more than one thing at the same moment, he was very easily interrupted. "I supply," said he, "the want of *extent* in my attention by great order and regularity; and its want of *continuance*, by frequently returning to the same subject." From this methodical proceeding it arose, that few men were ever more persevering than Le Sage in directing their researches to the same objects.

His memory was unmanageable and capricious in a high degree. He had no power over it; and, in order to direct it, was obliged to have recourse to all sorts of artifices. He siezed, with avidity, the moments when his ideas were clearest, and his faculties most active. "I have," says he, "extreme difficulty in connecting my thoughts, so as to make an assemblage at all supportable; and am like a painter who would work in the night, without any other illumination than what was derived from sudden and unexpected flashes of lightning.

His method and order, in some respects, supplied so well the weakness of his memory, that, in conversation, no defect of that faculty was at all discernible. It was, accordingly, one of his constant sources of complaint, that he could not convince his friends of the badness of his memory. They who conversed with him, heard him perpetually relate, with precision, the dates, and even the most minute circumstances, of very inconsiderable events. They believed his memory to be tenacious; whereas the truth was, that he kept notes of every thing, and was every now and then consulting his repertories.

Such being the weakness of his intellectual organization, he often asked himself, how he had ever been able to do any thing at all. To this question, his own manuscripts afford many answers; one of the best of which is in a note, entitled "*Clef de Mon Tour d'Esprit.*" I have been born with four dispositions well adapted for making progress in science, but with two great defects in the faculties necessary for that purpose. 1. An ardent desire to know the truth. 2. Great activity of mind. 3. An uncommon [*justesse*] soundness of understanding. 4. A strong desire for precision and distinctness of ideas. 5. An excessive weakness of memory. 6. A great incapacity of continued attention.

By using the resources which nature had bestowed, and compensating, by much skill and labour, the want of the qualities she withheld, he was able to make no small progress even as an inventer in science. He used to apply to himself the saying of Bacon—*Claudum in via cursorem extra viam antevertere.*

One of the principal causes that retarded the publication of his works, was the difficulty of making his favourite system be relished in the scientifick world. The conviction which he himself had of its truth, and the com-

plete persuasion that it must ultimately prevail, could not prevent him from perceiving, that though all acknowledged the ingenuity, yet few were prepared to admit the truth of his theory. He was perfectly aware, that his own way of thinking on this, as well as many other subjects, was peculiar, and not readily adopted by other men.

This is strongly marked by the title of one of his parcels of notes; "On the immiscibility of my thoughts with those of others." He has investigated, in his usual way, the causes of this immiscibility, and has divided his readers into different classes, according to their greater or less fitness to judge of the principles of his philosophy. He has applied to himself a line of Ovid, with much truth——

Non ego cessavi, nec fecit inertia serum.

Without entering on this discussion, we shall endeavour to give the best idea we can of the system so often mentioned, as far as we have been able to collect it from his letters, and from the very ingenious tract, *Lucrece Neutonien*, which M. Prevost has introduced into his Appendix.

The object of this system was to explain the law of gravity both as it prevails on the earth and in the heavens, by the principle of impulse. The causes of all the motions we perceive in the material world, may be reduced to three—Impulse, Attraction, and Repulsion. Impulse acts by contact; one moving body communicates motion to another body; and the rule by which this change is produced, is, that the motion communicated in any given direction, and that which is lost in the same direction, are precisely equal. The motions that we ourselves impress on the bodies around us, are of this nature.

Again; when a stone falls to the ground, or when iron approaches a magnet, motion is produced without contact. Both the bodies acquire motions which are equal, but in opposite directions. The motions ascribed to repulsion are of the same kind with these last, inasmuch as there is no contact, and as the motions acquired in opposite directions are equal. The only difference is, that the bodies, instead of approaching, recede from one another. Whether attraction and repulsion may not be regarded as one and the same law, acting under different circumstances, we do not at present inquire. The object of Le Sage was to reduce them both to impulse; and, could this be done, it would, no doubt, be a great advance in science; and we might seem, in one quarter at least, to have pushed our researches to their legitimate and proper termination. Our idea of the communication of motion by impulse, is not without difficulty; but it is clearer and more familiar to us than any other, and is that with which the mind is most disposed to remain satisfied.

The chrystalline spheres of the ancients may be regarded as the first attempt to explain the motion of the heavenly bodies by impulse. The vortices of Descartes is the next. The ether of Newton is the third. The first is known to be without foundation. The second is a vague and gratuitous supposition. And the third is, at best, far from being satisfactory.

Le Sage has certainly been more fortunate than any of his predecessors; and his hypothesis has this undoubted superiority above all the others that have been proposed for explaining gravitation, that it assigns a satisfactory reason why that force varies inversely as the square of the distance.

Suppose that, through any one point of space, innumerable straight lines are drawn in all different directions, each making a very small angle with those that are nearest it; and let a torrent of particles, or *indivisible atoms*, move continually in a direction parallel to each of these lines, the section of each torrent, in a transverse direction to its motion, being equal

to the section of the sensible world in the same direction. Thus, there will be an indefinite number of torrents of atoms intersecting one another, in every possible direction, much like the streams of light which issue from all the points of the surface of a luminous body. The analogy between the emanation of light and the motion of those corpuscles, is so close, that an imagination which is familiar with the one, will not experience much difficulty in becoming familiar with the other. Like light, also, the atoms, of which these torrents are composed, must be supposed to move with inconceivable rapidity, and to be of such extreme minuteness, that, though flowing continually in all directions, they do not obstruct or interfere with the motions of one another.

If, now, it be supposed that these atoms are unable to penetrate the solid and indivisible particles of bodies, and, when they enter bodies, can only pass through the intervals or vacuities between their particles, it is evident that they must strike against those particles, and must, therefore, communicate a certain degree of motion to them, or to the bodies of which they are composed.

If, then, there were but a single body in the universe, with whatever force the torrents of atoms struck against its particles, the body would remain at rest, the impulses in opposite directions being perfectly equal. But if there be two bodies, then, since each of them, by intercepting a part of the atoms of the torrents, will shelter the other from the action of so much force, it is evident that the bodies will be both impelled toward one another, and that each of them will receive fewer shocks on the side where the other body is, than on the opposite. Further, if we suppose the bodies spherical, the intensity of this force, *cæteris paribus*, will be proportional to the angular space included within a cone, which has for either base the transverse section of the bodies. Now, it is easy to prove that this angular space is proportional to the square of the distance of the bodies inversely. Therefore, the force with which the bodies will be urged toward one another, will be inversely as the square of the distance, which is the law followed by gravity.

This will be true if the bodies are equal in quantity of matter, so as to intercept equal quantities of the atoms. But if their quantities of matter are unequal, then, at an average of all the chances, each will intercept a number of particles proportional to its quantity of matter, and so the forces with which the bodies are impelled toward one another, will be as the quantity of matter directly, and the square of the distance inversely. This is precisely the law of gravitation; and the particles by which this effect is brought about, are called by Le Sage the gravifick, or the ultramundane atoms.

This hypothesis, as already observed, must be confessed to have done what no other attempt to account for gravity can boast of; that is, to have assigned a reason why that force is inversely as the square of the distance, and directly as the quantity of matter. It has, then, the precision which belongs to truth, and which, though it does not amount to a proof of a hypothesis where it is found, is an abundant reason for rejecting one, where it is wanting.

The vortices of Descartes, and the ether of Newton, do neither of them give any reason why gravity should be supposed to obey one law more than another; why it should be inversely as the squares, any more than the cubes, or any other power, nay, any other function, of the distances. The extreme vagueness of such hypotheses is an unsurmountable objection to them, and, even were they true, it renders them of no use whatsoever.

Concerning a cause so imperfectly understood, we can never reason at all; and we derive, therefore, no advantage from knowing it to be true. The knowledge of the fact without the cause is just as valuable.

The above is the outline of Le Sage's theory. To follow it into all its detail, and all the variety of its applications, is a task for which we are not prepared, and one quite foreign from our purpose. It is enough if we can, in any degree, awaken a curiosity which the works of the author are afterwards to gratify.

Some objections to this theory have been stated in the letters that Le Sage received from his correspondents. Boscovich, who had a system concerning the different forces which are the cause of motion, the very opposite of what has now been laid down, one in which all contact and immediate impulse are denied, could not possibly admit the theory of gravifick atoms, and has stated an objection to it, which appears to us of considerable weight. The action of these atoms supposes a vast superfluity of matter, and an infinity of corpuscles, created, each, to give, at most, only a single blow, and many of them never to have any effect whatsoever. An immense multitude of atoms, thus destined to pursue their never ending journey through the infinity of space, without changing their direction, or returning to the place from which they came, is a supposition very little countenanced by the usual economy of nature. Whence is the supply of these innumerable torrents? Must it not involve a perpetual exertion of creative power, infinite both in extent and in duration? The means here employed seem greater than the end, great as it is, can justify; and Le Sage must be allowed, if his system is rejected, to have had the merit of imagining a species of machinery more powerful and extensive than even the preservation of the universe can be supposed to require.

Another objection which, we understand from the author himself, had been made to his hypothesis is, that, were it true, a body enclosed on all sides, ought to gravitate less to the earth, than if it were in the open air. The roof or vault over head, would of course diminish the action of the *gravifick* atoms that had to pass through it, and would make the body fall to the ground with less velocity than it would have done in the open air. To this it was easy to reply, that the effect here stated is real on every supposition; but is so small, that it cannot be measured in our experiments. The gravitation of a heavy body, in a room, to the roof above it, must, on the common hypothesis of attraction, diminish its weight just as much as it would be diminished by the roof's obstructing some of the gravifick atoms. In both cases, the effect would be precisely the same, but too small to make any sensible diminution of the gravitation toward the great mass of the earth.

The obstruction which the gravifick atoms would give to the motion of bodies, by producing a kind of resisting medium, was also objected to the doctrine of Le Sage. This might, no doubt, be answered, by alleging that the same effect may as well be ascribed to light, which, in this respect, is in circumstances very similar to the gravifick atoms. Indeed, the analogy between those atoms and the particles of light as emitted from bodies, affords the means of refuting the greater part of the objections alleged against the existence of the former. This, however, supposes that the phenomena of light are interpreted in the Newtonian manner, or by an emanation from luminous bodies. If light is considered as an elastick fluid, the vibrations of which communicate to the eye the impressions which give rise to vision, the analogy referred to has no place. Accordingly Euler, in his letters to Le Sage, observes, that this analogy had no

weight with him, as he did not believe in the emanation of light. He inclines to account for gravity from the pressure of a subtle matter composing a vortex. He is not very explicit, however, and has left us much in the dark as to his opinions on the subject. His letters are, nevertheless, very interesting, particularly that dated from Berlin, 6th April 1763.

It is a good remark of Le Sage, speaking of the analogy between light and the gravifick atoms, that if all bodies were transparent, so that light was never stopped in its course, it [light] would not be perceived by us, nor apprehended to exist, any more than the corpuscles to which he ascribes the cause of gravity. We are, in truth, indebted to darkness, or the absence of light, for our idea of the latter, as a separate and independent substance. Without the information thus afforded, we might be induced, by reasoning, to believe that there was something necessary to vision, beside the eye and the object; but we should have no proof of its existence from immediate perception, any more than we now have of the cause of gravitation.

Le Sage certainly did not borrow his notions concerning the cause of gravity from any one; but he was not the first to whom such notions had occurred. Fatio de Duillier had, in some respects, anticipated the doctrine of gravifick atoms; at least, he had conceived a mechanical explanation of gravitation, which agreed in several particulars with that which has been described above.

The name of Fatio is well known to those who have studied the controversy between Newton and Leibnitz. He was a mathematician of considerable eminence, though, noted for a strange departure from the character of a philosopher, by joining himself to a set of fanaticks, who carried their extravagance so far as seriously to undertake the raising of the dead. Fatio, however, never published any thing on the cause of gravitation; and his treatise on it remains still in manuscript. M. Le Sage was first informed of this in the year 1749, by professor Cramer, not till after his essay, *Sur les Forces Mortes*, in which he treated of this subject, was communicated to the Academy of Sciences at Paris. Le Sage left nothing undone to rescue the work of Fatio from oblivion, taking much interest in the fate of a theory founded on the same principles as his own, and invented by a man of acknowledged ability. Fatio died in England, in the year 1753, in Worcestershire, at the age of ninety. His manuscripts had fallen into the hands of his neighbours, and of the people with whom he lodged. Some friends of Le Sage's, in London, had the good fortune to procure them for him. He soon after deposited them in the library at Geneva, where they still remain.

It is worth observing, that this theory of Fatio must have been known to Newton, with whom he lived in friendship, not merely from a resemblance in their philosophick, but also, as has been alleged, from an agreement in their religious sentiments. Yet it is no where hinted at by Newton, even when he is engaged in inquiries on this very subject. It is probable that he did not approve of the system of his friend, who does not appear to have had the same clear views of the matter with Le Sage, nor to have had the same ingenuity in removing the objections to his theory.

A prejudice of a very unphilosophick nature has lately prevailed in this country, against attempts of the kind made in the writings of Le Sage. It has been represented as impious, and savouring of irreligion, to offer any physical or mechanical explanation of the force of gravity.

This, we must observe, is quite a new doctrine. Newton, who was a man of true and sincere piety, thought that he was doing nothing more inconsistent with his duty, when he was endeavouring to explain the action

of gravity by that of an etherial fluid, than when he emonstrated that the planets revolve in elipses, and describe round their common focus areas that are proportional to the time. Dr. Clarke was of the same opinion, and has admitted, that a mechanical explanation of gravity would be of great importance in philosophy. Such an attempt is undoubtedly attended with difficulty; and perhaps we are destined to remain for ever ignorant of the cause which produces the phenomena of attraction. There can, however, be no impropriety in endeavouring, while there appear to be two kinds of causes that produce motion, to try to reduce them to one. If this is maintained to be impious, it must be on the same principle that Anaxagoras was charged with irreligion, for affirming that the planets are bodies like the earth. The same mistaken zeal has, in every age, opposed the same obstacles to the advancement of true philosophy.

We had almost forgot to mention the particular drift of Le Sage in the tract on the gravifick atoms, which he calls *Lucrece Newtonien*. He endeavours to show, that Epicurus, with a little attention to geometry, and the possession of no more physical knowledge than was to be found among some of his contemporaries, might have been led, by the atomical system, to the discovery of gravitation, and of the laws of the planetary motions. The tract is very ingenious and interesting.

The subject of Teleology, or the doctrine of final causes, was one which occupied the thoughts of Le Sage, at intervals, during his whole life. Of his speculations on this subject, we are presented with a few fragments, that are in no small degree curious and interesting. The publication is by M. Reverdil, who had assisted in the composition of the work, and to whom Le Sage, in his will, left the charge of this manuscript. About the year 1740, Le Sage formed the plan of a *Theory of the Ends of Nature and of Art*. Wolf, who at that time taught the philosophy of Leibnitz in Germany with great reputation, in his treatise on logick, recommended the Theory of Ends to be treated under the name of Teleology; and this term was adopted by Le Sage. M. Reverdil informs us, that Le Sage was confirmed in his design, by finding that some men of great celebrity had, about that time, conspired to combat the doctrine of final causes; some of them on a principle of universal scepticism; others to give weight to the proofs of the existence of God derived from other sources; and many, struck, no doubt, with the weak and childish arguments that had been often maintained on this subject. Le Sage wished to oppose all these, and in particular the latter, by showing that the theory of final causes was not necessarily of the vague and unsatisfactory nature just alluded to.

The greater part of the works, says he, that have made their appearance on this subject, contain principles so vague and unsupported, observations so puerile and detached, and reflections so commonplace and declamatory, that it is not wonderful if they produced an effect the direct opposite of that which was intended. A theory of ENDS, or FINAL CAUSES, might be given, exempt from these great defects; embracing the objects both of nature and art; furnishing, first, rules of synthesis for the composition of a work, when the ends and means were both given; and, next, rules, of analysis for discovering the intention of an artist, from the examination of his works.

M. Reverdil has given us only a few fragments from the treatise which had been drawn up conformably to this plan. Those that follow will show in what manner Le Sage had endeavoured to avoid the faults which he has reprobated in others.

A wise cause must have respect to the smallest degrees of good; because, if they are not infinitely small, the amount of the whole may be of importance; so that, if they were neglected, a considerable quantity of evil might arise.

There is nothing incongruous, therefore, in supposing the Divine Wisdom exercised in determining the curvature of the wing of a scarabæus, or in planning the cells of a bee-hive. It may be true, that it imports little to the universe, whether a scarabæus fly with more or less ease, or a bee employ its wax with the greatest possible frugality. It imports much, however, to the scarabæus or the bee, and, on that account, is an object not unworthy of the attention of the Creator. If precision in the structure of the wings or cells of these insects is useful for any purpose, however small that utility, multiplied by the number of all the scarabæi, and all the bees which have been, which are, and which are to be, may become of a considerable amount.

When the execution of any purpose gives rise to inconvenience which admits of remedy, of all the remedies that can be applied, that is the best which rises out of the evil itself; because it is always at hand when wanted, and is sure to possess the necessary strength. Such remedies are sometimes to be met with in the arts. It was thus that a hint of Monsieur the prince of Conti, furnished Réaumur with the means of admitting the necessary quantity of air into his furnaces for hatching chickens, by making the heat of the furnace open the door of a register. The girdiron pendulum of Graham is an instance of the same kind.

In nature, the contraction and dilatation of the pupil of the eye, is a most remarkable instance of an inconvenience corrected by its own operation.

When all the accidents which happen to a work derange it; and when all those that can happen to it have a tendency to do the same, that work is the best possible. For it is evident, that it either cannot be improved, or that the improvement of it is highly improbable.

When all the good of a system can easily be traced to general principles, and when all the evils appear to be exceptions closely connected with some good, the excess being evidently, though perhaps but in a small degree, on the side of good, the contriver must be regarded as beneficent.

Hypothetical reasonings, whether concerning final or efficient causes, are susceptible of the highest degree of evidence when two conditions are fulfilled; when the given hypothesis explains many phenomena, and contradicts none; and when every other hypothesis is inconsistent with some of the phenomena.

As it is very rare that one is able to reckon up all the *hyphotheses* imaginable, in order to show that only one of them can be received. The best philosophers, and the most scrupulous, have contented themselves with less, and have thought it sufficient if the hypothesis which they adopt explains many phenomena with precision. The more numerous the phenomena, and the greater the degree of precision, with the more confidence do they conclude, that no other supposition will account for the appearances. It is on such a foundation as this, that the theory of gravitation is established.

On the whole, we conceive that this treatise on Teleology is written on more philosophical principles than most of those that have appeared. And we cannot but regret that it has not been given to the publick entire, or with such alterations as the changes in the state of science might seem to require. The date of the MS. is 1756, and, since that time, the discoveries in philosophy must have, no doubt, added considerably to the examples that might be brought to illustrate the doctrine of final causes; a doctrine which we cannot help thinking might be so treated, as to form one of the most beautiful and interesting branches of human knowledge. Indeed, we should be glad to think that more of the works of our learned and ingenious author were destined to see the light. M. Prevost, who, in the biographical sketch before us, has so judiciously consulted the reputation of his friend, and the information of the publick, has it still in his power to render an important service to both.

FROM THE MONTHLY ANTHOLOGY.

Memoirs of the Philadelphia Society for promoting Agriculture. Containing Communications on various subjects in Husbandry and Rural Affairs. To which is added, a Statistical Account of the Schuylkill Permanent Bridge. 8vo. pp. 331. Philadelphia, 1808.

TO blend the ingenious speculations of theoretical agriculturalists with the judicious observations of practical farmers, promises the highest advantages which the science of agriculture is susceptible of affording. Indeed the union of science and practice is desirable in any pursuit, and ought to be effected in every department of human knowledge. A character that embraces them, in any eminent degree, is alone worthy of the dignified title of philosopher.

Agricultural occupations are of unquestionable importance to society, and immediately involve the general interest the support and happiness of a great portion of labouring men. This science, in a high degree, requires the aid of rich, intelligent men, whose affluence and talents give them the power, and whose taste and judgment impel them to the pursuit. Such men, when they devote their talents to the subject, merit the highest praise, and it is with regret that we observe they do not always meet their reward in abundant produce or the gratitude of society. Yet many such are to be found, who, isolated in the community, and having no opportunity to improve by the suggestions of others, or to impress upon agricultural experimentalists the utility of their own plans, are left to suffer from the loss of some unsuccessful schemes, without the satisfaction of seeing their valuable improvements imitated by their ignorant neighbours.

The dispersed population of the United States, arising from extent of territory and the generally favourable soils throughout the union, and the cheapness and facility with which extensive tracts of land can be procured, are difficulties in the way of great advancement in rural economy, which nothing but time and a rapid increase of population can effectually surmount. From these causes arise, in a great measure, the slovenly, unproductive, and laborious process of husbandry, so disgusting to an English visitant, and so adverse to the comfort, cleanliness, and happiness of the American farmer. These are the obstacles to the establishment of good husbandry and manufactures. In both, the desideratum should not only be, what is best to be done, but *what is the best mode of doing it, at the least expense of time and labour;* and as in internal traffick, transportation should ever add, in the least possible degree, to the price of any article, so in agriculture, the produce should be obtained at the least possible expense of physical labour.

The organization of plants, and their peculiar, specifick construction, constitutes a pleasant and fascinating study; but when we investigate the wonderful progress which they make from the seed, through their diversified varieties of growth, to decay, with a view to agricultural advantages, we shall find, that the mere, practical farmer knows as little of the principles of vegetation as the tailor does of the human system. Agriculturalists are content with studying a few of the functions of plants. The motion of the sap and of the fluids, their secretion, irritability, nutrition, vegetable transpiration, germination, foliation, fructification, and many more qualities are to be studied, and the climate, soil, situation, treatment, food, &c. peculiar to each, carefully ascertained, that the process of vegetation may proceed in the best possible manner. This knowledge is not within the reach of common farmers, nor can they even conceive the meaning of many of the terms. In order, therefore, that the science of agriculture may be advantageously connected with practical husbandry, nothing can so

essentially contribute, as the establishment of private or publick societies under the sanction and patronage of government. Such companies will possess an inherent influence and exercise a kind of agricultural jurisdiction over the country, which could not be felt by any number of disconnected individuals, however laudable might be their inquiries, or however successful their exertions.

The Philadelphia Society for promoting Agriculture, was formed in 1785, and after a few years of active exertions, it languished and remained inactive, until in 1804 it revived, and now promises a series of useful labours. In 1806, the second list of prize questions was given to the publick, the first having been published in 1791, and the earliest letter contained in this volume is dated June, 1805.

A preface, table of contents, the laws of the institution, list of members, outlines of a plan for establishing a state society of agriculture in Pennsylvania, a list of premiums, and a curious lecture, by Dr. Rush, on studying the diseases of animals, form the introduction. The petition for establishing the society was rejected by the legislature; but, upon what grounds, we are unable to discover.

The writer of the preface has taken a very fair and general view of the several objects within the plan of the society, and we agree with him, that "criticism is misapplied and out of place, on such occasions," if the objects of the undertaking are steadily pursued, and the contemplated advantages of the work realized. Accurate and intelligible descriptions, lucid and faithful statements of experiments, and simple, technical language are of the utmost consequence in works of this kind, and we are happy to notice, that this volume contains so large a share of these indispensable requisites, however deficient in style, and literary excellence, it may otherwise appear.

Breeding of sheep has lately occupied the attention of many practical farmers, particularly since the unfortunate interruption of our commerce with Europe; but more especially since the patriotick example already given to the publick by Col. Humphreys. The Merino sheep, brought from Spain by that gentleman, have excited a spirit of inquiry and experiment, which promises great profits to the owner, and affords flattering prospects to the publick. In crossing the breed of animals, an accurate attention is requisite to the character, properties, and shape of the one whose qualities are designed to be preserved, as otherwise no beneficial result can be obtained, and the few individuals of the new kind will degenerate. We should, therefore, introduce the males of the finest species to the females whose breed we intend to improve, because the offspring, though it partakes of the nature of both parents, yet resembles most the character of the male, especially in live stock. We do not intend to give any disquisition upon the subject, but only to express a regret, that the work before us contains so little upon this very interesting department of rural economy. One letter, containing a few desultory remarks upon the expediency of introducing the breeding of sheep into Pennsylvania, on a more extensive scale than hitherto practised, and another letter upon the diseases of that animal, constitutes all the information that can be obtained from the first volume.

As it will not be possible for us to notice particularly all the several papers contained in this work, we shall select only such as, by the manner in which they are treated, and their obvious utility, merit attention. We notice a letter to the society from Mr. Algernon Roberts, upon the expenses and profits of a dairy, which is the only good instance, in the whole

work, where the result of several years practice is stated with accuracy and clearness. This method of describing experiments particularly, will contribute more than any other, to the diffusion of correct information.

Agreeably to the request of the society, I lay before them an account of the butter I sold from a dairy of twenty cows, during eight years, viz. from 1st of January, 1796, to 31st. December, 1803. The weight amounted to 27,835 pounds, being an annual average of 3479 pounds, or 173 pounds to each cow per year.

Cash received for butter sold from twenty cows in eight years,	$ 8276	19
Consumed in family the milk of three ditto,	1506	
Sucking pigs estimated at,	320	
17 cwt. of pork at $6 per cwt. sustained by dairy,	816	
20 calves at $4 each,	640	
	11558	19
	7748	
	8)3810	19
	476	
Twenty cows at $ 30 each is $ 600 at six per cent,	$ 36	
Grain for winter food,	300	
Hay, straw, &c.	300	
A man and woman's wages,	300	
76 times expenses going to market, at 25 cents per time,	19	50
Summer keeping of a bull,	13	
	968	50
Annual expense multiplied by	8	
	7748	

In the above estimate, I suppose all the sustenance of the pigs to proceed from the dairy, as any other food their dams had, is supposed not to exceed the amount of pigs used by the family, and of those sold alive; it is likewise supposed that one half the food of the other swine, consisted of the offal of the dairy. The calves were sold on the spot. The item of the family milk is founded on a supposition, that it would take three cows to give milk to a family of ten persons, a considerable proportion of which are children. It is also to be remarked, that in the autumn months of part of the years included in the calculation, there were some persons added to the family, in consequence of the epidemick fever, prevalent in the city of Philadelphia, and who caused a diminution in the quantity of butter sold. It is difficult to estimate the expenses. The interest is founded upon a supposition that each cow costs 30 dollars; and the winter keep is set down as equal to her full value. The dairy is supposed to be managed by a man and woman, who are thought fully equal to the task, and their wages as stated, a full reward. The marketing is supposed to be done by the man, who is allowed eight cents each time, for expenses, exclusive of horse standing at the city stable, ferriage and turnpike toll. Nothing is allowed for the bull, except his summer pasture, as it must be very bad management if he does not sell in the autumn, for more than he cost in the spring. His manure also is to be taken into consideration. The allowance for replacing dairy cattle is thought to be trifling, as they are most frequently sold, with proper management, when turned off for grazing, for more than their prime cost. Their manure is supposed equivalent to their summer pasture.

The neat profit then is $ 3810 19 for eight years; this sum divided by 8 gives $ 476 27; which being again divided by 20 (the number of cows) will give the average per head, viz. twenty three dollars and eighty one cents.

Mr. Richard Peters, the president of the society, has certainly contributed his share to the formation of this volume, and his several letters on the different subjects to which he has turned his attention discover an anxious zeal for the promotion of agricultural knowledge. His letters "On peach trees," "Departure of pine timber," &c. "On the injurious effects of

clover to orchards," "On diseases of Cattle," "On gypsum," "On the thickness, cement, and materials of walls of farm and other buildings," "On orchards," "On coarse flour," &c. "On herbage and shrubs spontaneously produced," &c. "On trench ploughing," "On hemlock for live fences," "On changes of timber and plants;" and his "Observations on a stercorary," merit the attention of every rural economist.

The practice of farming has long been, and we fear will long remain, a standing mark of the slow progress of the useful arts in the United States. Foreigners, who in other respects, notwithstanding their superficial observations, may receive favourable notions of our comforts, taste, and improvements, cannot fail to observe the state of our fields, the agricultural productions, mode of farming, and the rural economy of the states; and if on these subjects they could make the just allowance on comparing them with European advancement, American farming would not be degraded by the comparison.

Whatever importance may be attached to the study of agriculture as a science, an ordinary, intelligent farmer will principally attend to the nature of the soil he cultivates, and observe carefully how he may best improve it by the application of manure. In few cases will he be deceived in ploughing, if he turns up the soil only so deep as to admit the seed to a suitable depth, and leave sufficient room for the roots to spread. As vegetation receives its impulse from the black mould, which every where covers the earth with varying thickness, and which was formed and is continually increased by the successive decay of vegetables, and as this vegetating power is weakened and exhausted by successive crops, it must be again replenished by art. Manures, whether consisting of calcareous earth, or of vegetable compost manure, are of the greatest consequence, and with the preparation of the soil by ploughing, harrowing, rolling, &c. constitute the chief objects of employment for the agriculturalist.

On the subject of manures, there are two letters, one communicated by J. Mease, on the utility of a species of marle, found in Burlington county. This substance answers very well alone; but two loads of it mixed with one of barn manure, is the best mode of using it. Mr. Peters has also given a valuable paper on the employment and nature of gypsum, as a manure. His observations are the result of many years' practice, and merit confidence. The qualities of this article have been hitherto but little understood, and it will require much study to discover the manner in which it operates. Chymistry is of great importance to this branch of husbandry, and although few farmers are acquainted with the subject, yet they have a right to expect something like a scientifick investigation, from such a society as the authors of the present publication. The combination of gypsum or sulphate of lime with the dung from stables, and the vegetable manure in farm yards, forms a good compost, that can be procured at little expense, and is applicable to the greatest varieties of soil. Gypsum aids the putrefaction of the vegetable substances in manures, and in the decomposition produces hydrogen, carbonick acid, oxygen, and other gasses, of which plants are formed; and the warmth produced while the process is going on is one of the specifick properties of manure, and which when mixed with the soil, facilitates the absorption of nutriment by the roots of plants. Hence, that compound, which contains the most of the qualities and powers necessary in the vegetating process, should be procured. The improvements which have been so lately made in agriculture, among English farmers, are in a great degree to be attributed to the study of chymistry, as connected with agriculture.

Hydrogen is seen to escape from compost heaps during the decomposition, in form of a vapour; the carbon discovers itself in the manure, after an extensive putrefaction, and in the black hue assumed by the mould, wherever found, more distinctly, however, in those soils where composts, containing large quantities of this substance, have been employed. The liquor which drains from dunghills, unless mixed with some accidental, extraneous matter, is nothing but water strongly impregnated with carbon, and after standing a considerable time, the carbon will subside to the bottom of the water. Carbonick acid gas is often seen to escape in great quantities from soils where manure has been used, in which there was a large proportion of carbon. These being the principal agents in accelerating vegetation, the attention of agriculturalists should be directed to provide them from calcareous earths or compost manure, so as to apply them in the cheapest manner to the improvement of the soil.

The best means of preserving manure, is supposed to be a stercorary or compost pit, which is better calculated to permit the fermentation to go on, than any mode hitherto proposed. Mr. Peters has given a very good description of one, which we shall insert.

A stercorary should be at some distance from the stables. It is best for its bed to rise about two feet in the centre, like the back of a tortoise, with channels round it, to conduct the sap into a small well, or reservoir, which may be pumped, or laded out; and the drainings returned on the heap. Those who choose it may have the bottom paved, and surrounded by a stone wall, three feet high; on which the sills of the frame for the roof may lie. It should be covered by a roof of wood, or thatch, on posts; open at the sides for air, and railed, or stripped round, high enough to prevent access by cattle; whose treading or poaching the heap, impedes its regular fermentation. Spouts, or troughs, at the eves of the roof, may be furnished with small cross troughs, to lead in rain water occasionally; though it is seldom required; as its own juices are generally sufficient, for the supply of the necessary moisture to the dung. Under the pitch of the roof, over the heap, there may be a pigeon house; and roosts for poultry, whose dung would increase, and meliorate the whole mass. The square of the frame should be about eight feet from the bed, that carts, &c. may be admitted to enter, with convenience. Those who experience its utility and value will never regret the expense. A parallelogram is the best ground plat.

The above description is taken from a note, in page 153, in preference to another, more particular, which cannot be clearly understood without the plate.

Within the last half century, husbandry has assumed an important character in England. Among the most striking effects agriculture has produced, is the method of preserving, by the rotation of crops, the powers and richness of tillage lands, and the consequent disuse of the deteriorating system of fallows. This is the "most prominent feature in good farming," and it is to be regretted that the present volume contains nothing upon this subject.

Wheat, however, has received more attention. The smut, blight, mildew, and a new disease, have all been discussed, and notwithstanding the judicious remarks and valuable experiments here related, together with the various examinations made by English and French agriculturalists, the origin of these diseases, particularly smut, remains concealed. Cautious and prudent farmers, wishing to avoid the loss of a crop, generally wash the seed in a brine containing saline matter. There is a letter from William Young, in which he says that well chosen seed, sown in a suitable and well prepared soil, are the only sure modes of avoiding smut; while, in the succeeding letter, by Dr. Mease, a contrary opinion is maintained, and saline washes and steeps are the only preventives. Such

contradictory results are little calculated to excite confidence, or to lead common farmers, always unwilling to quit established habits, to adopt either expedient.

The remarks upon live fences are extremely interesting.* A substitute for the hawthorn of England, is found in our native locust, cedar, and hemlock; and a taste for rendering more beautiful the appearance of our farms, would be produced by the adoption of this mode of fencing. Plashing of hedges would supply a great proportion of the fuel used in farm houses, and leave the fences almost impervious to cattle. Cold and bleak parts of a farm may be easily protected from winds, by suffering hedge rows to grow high, and by plashing and switching, the fence will be prevented from overshadowing much land. In some soils, hemlock will be preferred to any other tree, for it is the most susceptible of being cut, wove, and interlocked, and gives a rich and lively appearance to the fence. Cedar often becomes brown, and in many situations is pernicious to the fields enclosed by it.

The agricultural papers in this volume, except an appendix containing valuable extracts from foreign publications, are concluded by a memoir on clearing land, by John Taylor, Esq. who appears to be an intelligent and enterprising agriculturalist. As there seems to be a mania in the New England states for retiring to new and uncultivated districts, the good policy of which may be questionable, Mr. Taylor's observations deserve attention. The fertility of new lands, arises from the great quantities of vegetable matter which have been collecting and rotting for centuries, so that little labour in manuring for several years, is requisite. Hence the reason why farmers seek new settlements. Clearing and recovering lands which once were cultivated, but which are again covered with a growth of wood and brush, require greater exertions, and demand the process of manuring, as they cannot, by any natural decay of vegetable matter, have recovered from their exhausted state.

We have thus taken a cursory view of the work before us. The individual character of a volume must be drawn from the design and circumstances of the publisher. A single author, having the exclusive management of his subject, may expose himself to censure and criticism, which are not commonly bestowed on a compilation like the present. We have omitted many articles which are worthy of notice, but which the limits of this review will not include, and passed unnoticed many faults, inseparable from the nature of the work.

The agricultural society of Philadelphia have given to the publick such a specimen of their talents and pursuits, that the community will look forward with pleasure to the publication of a second volume. We hope they will not forget that important problem in rural economy, hitherto unsatisfactorily solved, *What is the best plan and arrangement of a farm house and farm yard?* Every thing that can contribute to the comfort of the farmer and his stock, and most usefully promote the mechanical department of husbandry, will, on many considerations, highly interest the publick, and come within the object of their institution. Economy, cleanliness, and good morals, are essential to the good order and happiness of the husbandman, and his prosperity depends on the cultivation of these domestick virtues. Neat husbandry and a productive system of culture are inseparable; and if the same work which a careless farmer expends upon a large number of acres, were bestowed upon half the quantity of land, the crop

* Several species of them are common in New England.

would generally be the same, and much labour would be saved. But as prejudices and idle habits remain, long after the advantages of a change are demonstrated, we must wait patiently, and hope that the exertions of this society, and the enterprise of many private gentlemen, will soon raise our husbandry to the rank it ought to hold among the improvements of the country.

The statistical account of the Schuylkill Permanent Bridge, is very acceptable, because it furnishes an interesting account of American ingenuity and enterprise. This branch of hydraulick architecture has been usefully practised by Mr. Palmer, whose models of wooden bridges, in many parts of the union, bear unequivocal testimony of his genius. Whoever desires to be acquainted with such works, will read the paper with attention. He will be led to admire not only the architect who planned, but the indefatigable and persevering spirit of the proprietors who undertook, unremittingly prosecuted, and completed this beautiful structure. We do not recollect any work of this kind, which has required such a depth of solid masonry below the surface of the water, as was indispensable in constructing the western pier. The masonry is laid forty-one feet below the surface of the tide, a depth unequalled in any bridge in Europe. There are many useful observations in the account, and the history of the work as it advanced, under the most embarrassing circumstances, is extremely interesting. The bridge is covered, and plastered with a very durable composition, which should be applied, in every instance, to similar works. We shall close our review with the inscription on the eastern tablet, because we readily assent to the justness of the sentiments therein expressed.

THE BRIDGE
is, *in itself,*
the most grateful
Reward
expected from its
Institution.
A Recompense
the most honourable to those,
who, by liberal advances,
and long privations of profit,
unassisted by publick pecuniary aid,
Encouraged and Supported;
And a Memorial,
the most acceptable to those,
who, by enterprising, arduous,
and presevering exertions,
ACHIEVED,
This extensively beneficial
Improvement.

The editors of the Select Reviews have, at the request of a member of the Agricultural society, subjoined the following outlines of a plan for the establishment of the Society.*

1. THE legislature to be applied to for an act of incorporation of the society, which is to consist of citizens of the state, as generally dispersed throughout the same as possible. In the first instance, the society to be

* These outlines were written several years since, at the request of a committee of the society, and furnished to them by Richard Peters, Esq. the now president, who laboured in the legislature of that day to effectuate the plan. But the most unaccountable and deplorable prejudices then existing, defeated every endeavour. During the present session of the legislature a charter has been granted to the society. 1809.

composed of such persons as may be named, and these to be vested with authority to make rules for admission of other members, and by-laws for the government of the society, as usual in similar cases. Honorary members to be admitted according to rules to be established, and these may be of any state or country.

2. The organization of the society shall be so formed, that the business thereof may be done by a few, who will be responsible to the body of the society, in such manner as their by-laws shall direct.

3. The governour of the state, the speakers of the houses of the legislature, and the chief justice, for the time being, to be the visiters of the corporation. The transactions of the active members, i. e. those intrusted with the monies and affairs of the society, by whatever name or description they may be designated, and all by-laws and regulations, to be submitted to the visiters; to the end that the same may be so conducted and established as not to prejudice the interests of the corporation, or interfere with or oppose the constitution or laws of the state. The visiters will also judge of the objects of the society, and perceive whether or not they are calculated to promote the ends of its institution. Reports may by them be made annually to the legislature. These will be useful, as they will exhibit, in a comprehensive view, the state of agriculture throughout the commonwealth, and give an opportunity to the legislature of being informed on a subject so important to the prosperity of the country, both as it relates to political economy, and the individual happiness of the people. The legislature will perceive from their reports, when, and in what manner, they may lend their assistance to forward this primary object: Whether by endowing professorships, to be annexed to the university of Pennsylvania and the college of Carlisle, and other seminaries of learning, for the purpose of teaching the chymical, philosophical, and elementary parts of the theory of agriculture: or by adding to the funds of the society, increase their ability to propagate a knowledge of the subject, and stimulate, by premiums and other incentives, the exertions of the agricultural citizens: or whether, by a combination of these means, the welfare of the state may be more effectually promoted.

4. Though it will be most convenient to make the repository of the information of the society, and the office or place of transacting its business at Philadelphia, yet it is intended that the society shall be rendered active in every part of the state. To effect this, there should be county societies established, organized as each shall think proper. In union with, or as parts thereof, there may be agricultural meetings or establishments, at the will of those who compose them, in one or more townships of a county. These may correspond with the county societies, and the latter may annually inform the society of the state (of which the less societies may be considered as branches) of all the material transactions of their respective societies. Societies already formed may remain as they are. They may, at their option, correspond directly with the state society, or through the society of the county in which they meet, as shall be found most convenient and agreeable to them. They will thus collect all the information and business relating to the subject, and will give an opportunity to the society of the state to see where their assistance is most necessary, and afford a facility of diffusing agricultural knowledge. The premiums, books, and other articles at the disposal of the society, may pass through the hands of the county or other societies, for many purposes; and they can judge on the spot of the pretensions of the claimants. The country schoolmasters may be secretaries of the county societies, and the schoolhouses the places of meeting, and the

repositories of their transactions, models, &c. The legislature may enjoin on these schoolmasters, the combination of the subject of agriculture with the other parts of education. This may be easily effected, by introducing as schoolbooks, those on this subject, and thereby making it familiar to their pupils. These will be gaining a knowledge of the business they are destined to follow, while they are taught the elementary parts of their education. Books thus profitable to them in the common affairs of life, may be substituted for some of those now used; and they can easily be obtained. Selections from the best writers on husbandry may be made by the society. The essays of our own experimentalists or theorists, and the proceedings of the society will also afford information; and, as many of these will, no doubt, be good models of composition, they may form a part of the selection for the use of the county schools. And thus the youth in our country will effectually, and at a cheap rate, be grounded in the knowledge of this important subject. They will be easily inspired with a thirst for inquiry and experiment, and either never acquire, or soon banish attachments to bad systems, originating in the ignorance and bigotry of their forefathers, which, in all countries, have been the bane of good husbandry. It will also be the business of the society to recommend the collection of useful books on agriculture and rural affairs in every county. The citizens of the country should be drawn into a spirit of inquiry by the establishment of small, but well chosen libraries, on various subjects. This would not only promote the interests of agriculture, but it would diffuse knowledge among the people, and assist good government, which is never in danger while a free people are well informed.

5. The general meetings of this society, consisting of such members as may choose to attend, and particularly those charged with communications or information from the county and other societies, should be held at Philadelphia, at a time, in the winter sessions of the legislature, when citizens who may be members thereof, or have other business, can, with most convenience, attend. At these meetings, the general business of the society can be arranged, its funds and transactions examined, and its laws and rules reported, discussed, and rendered generally serviceable and agreeable to the whole.

6. It will be necessary that a contribution be made by each member, annually, for a fund. But this should be small, that it may not be too heavy a tax. The funds will, no doubt, be increased by donations from individuals; and if the state should find the institution as useful as it is contemplated to be, the patriotism of the members of the government will be exercised, by affording assistance out of the monies of the state. They will perceive that it is vain to give facility to transportation, unless the products of the country are increased by good husbandry: and though these facilities are important to the objects of this society, yet an increased knowledge of agriculture is the foundation of their extensive utility. The subjects of both are intimately connected, and mutually depend on each other.

7. When the funds of the society increase sufficiently to embrace the object, it will perfect all its efforts, by establishing *Pattern Farms* in different and convenient parts of the state. Let the beginning of this plan be with one establishment, under the direction of the society, and committed to the care of a complete farmer and gardener. In this, all foreign and domestick trees, shrubs, plants, seeds, or grains may be cultivated, and if approved as useful, disseminated, with directions for their culture, through the state. The most approved implements may be used on this farm, and

either improved by additions, or simplified to advantage. Inventions may be brought to trial, and the best selected. Models thereof may be made and transmitted to the county and other societies. Those who are sent to, or occasionally visit the farm, will gain more knowledge, in all its operations, from a short inspection, than can be acquired, in a long time, by reading on the use and construction of instruments, or the modes of cultivation. The cheapest, best and most commodious style of rural architecture—the most proper and permanent live fences—improvements in the breed of horses, cattle, and sheep—remedies for occasional and unforeseen visitations of vermin—the times and seasons for sowing particular crops—the adapting foreign products to our climate—and preventives against all the evils attendant on our local situation, or arising from accidental causes—may here be practically introduced. The thoughts and suggestions of ingenious men may here be put in practice; and, being brought to the test of experiment, their utility may be proved, or their fallacy detected. This farm need not be large. On it the best systems now known may be carried through, and further experiments made. Promising youths may be sent from different parts of the state to learn, practically, the art of husbandry. Manures, and the best mode of collecting them, may be tried. Native manures should be sought after, and premiums given for their discovery. Their efficacy may be proved by small experiments on this farm, which should, in epitome, embrace the whole circle of practical husbandry. Similar farms may be added, as the funds increase; and thus practical agricultural schools be instituted throughout the state.

8. When the pecuniary affairs of the society become adequate, it will highly contribute to the interest of agriculture, if, at the expense of the society, some ingenious person or persons were sent to Europe for the purposes of agricultural inquiries. It would be well, too, if a few young persons of promising abilities were sent thither to be instructed in the arts of husbandry, the breeding of cattle, &c. and to gain a practical knowledge on all subjects connected with this interesting, delightful, and important business, on which the existence, wealth, and permanent prosperity of our country so materially depend.

9. Although it would seem that a great portion of this plan has reference to the older settlements of the state, yet, in fact, many of its most useful arrangements will apply to new settlements in an eminent degree. These settlements are, for the most part, first established by people little acquainted with a good style of husbandry. The earth, in its prime, throws up abundant vegetation, and for a short period rewards the most careless husbandman. Fertility is antecedent to his efforts; and he has it not to recreate by artificial means. But he is ignorant of the most beneficial modes whereby he can take advantage of this youthful vigour with which his soil is blessed. He wastes its strength, and suffers its riches to flee away. A bad style of cropping increases the tendency of fresh lands to throw up weeds, and other noxious herbage; and that luxuriance, which with care and system might be perpetuated, is indulged in its own destruction. It is discovered, when it is too late, that what was the foundation of the support and wealth of the improvident possessor, has been, by his ignorance and neglect, like the patrimony of a spendthrift, permitted, and even stimulated rapidly to pass from him in wild extravagance.

The products of nature, in our new countries, seldom have been turned to account. The timber is deemed an incumbrance, and at present is, perhaps, too much so. The labour and expense of preparing for tillage are enormous; and, when the sole object is that of cultivation, every discoura-

ging.* European books give us no lessons in these operations. But when the experience of our people is aided and brought to a point, by a union of facts and the ingenuity of intelligent men, now too much dispersed to be drawn into system, it is to be expected, with the surest prospects of success, that our difficulties on this head will be abated, if not overcome. The manufacture of potash, and the products of the sugar maple, may be objects of the attention of the society. More profitable modes of applying labour will hereby be promoted, and returns for expense, in the preparation for culture be obtained. Facilities for clearing lands may be discovered. Minerals, earths, and fossils, now either unknown or neglected, may be brought into use, or become objects of commerce. In fine, no adequate calculation can be formed of the effects which may be produced by a consolidation of the efforts, and even speculations, of our citizens, whose interests will stimulate them to exertion. Channels of communication will be established, and the whole will receive the benefits arising from a collection of the thoughts and labours of individuals, whose minds will be turned to a subject so engaging and profitable, as well to themselves as to their country.

FROM THE BRITISH CRITICK.

The Dramatick Mirrour, containing the History of the Stage, from the earliest Period to the present Time; including a Biographical and Critical Account of all the Dramatick Writers, from 1600, and also of the most distinguished Performers, from the Days of Shakspeare to 1807; and a History of the Country Theatres in England, Ireland, and Scotland, embellished with seventeen elegant Engravings. By Thomas Gilliland, Author of Dramatick Synopsis. 8vo. 2. Vols.

A WORK that would properly satisfy the promise of this title page, instead of being comprised in two moderate octavo volumes, might be extended to the number of the mighty production of Grævius and Gronovius, which are hardly complete in twenty ponderous folios. This work, however, may be probably both convenient and useful to the frequenters of the modern theatre, now so changed from what even we ourselves remember it, that could the shades of Betterton, Quin, and Garrick, rise from their elysium, it may fairly be questioned whether, with one or two exceptions, they would acknowledge their brethren of the sock. They might be apt to exclaim: Call ye this a play, or that an actor? In this respect at least we confess ourselves laudatores temporis acti. Some very neatly executed heads of various performers are introduced, of the resemblance of which we are not able to judge.

The Duties of Religion and Morality as inculcated in the Holy Scriptures, with preliminary and occasional Observations. By Henry Tuke. 12mo.

THE preliminary observations in this excellent little book are on the importance of religion and morality; on religion as the basis of morality; on the love of God, the holy scriptures, and the divine attributes. The author then proceeds to the discussion of religious duties, and moral duties general and particular. The general duties are those of justice, charity, temperance, industry, &c. The particular duties, those of husbands and wives, parents and children, masters and servants, &c. &c.

This is an unexceptionable book for young persons, and indeed for adults, and is highly creditable to the duly tempered zeal of the amiable author.

* At the present time [1808] the expense of clearing land is much lessened, owing to the great influx of population in our new countries. For five dollars per acre, land may be completely cleared of timber.

SPIRIT OF THE MAGAZINES.

FROM AIKIN'S ATHENEUM.

MEMOIRS OF PROFESSOR PORSON.

RICHARD PORSON was born at East Ruston, in Norfolk, on Christmas day, 1759; so that he was only in his forty-ninth year. Every thing about this most eminent scholar, and particularly the circumstances which laid the foundation of that most inestimable memory, by which he was enabled to store his mind with all the riches of literature, ancient and modern, will become truly interesting to the world. He owed the blessing to the care and judgment of his father, Mr. Huggin Porson, who was parish clerk of East Ruston; and who, though in humble life, and without the advantages himself of early education, laid the basis of his son's unparalleled acquirements. From the earliest dawn of intellect, Mr. Porson began the task of fixing the attention of his children, three sons and a daughter; and he had taught Richard, his eldest son, all the common rules of arithmetick, without the use of a book or slate, pen or pencil, up to the cube root, before he was nine years of age. The memory was thus incessantly exercised; and by this early habit of working a question in arithmetick by the mind only, he acquired such a talent of close and intense thinking, and such a power of arranging every operation that occupied his thought, as in process of time to render the most difficult problems, which, to other men required the assistance of written figures, easy to the retentive faculties of his memory. He was initiated in letters by a process equally efficacious His father taught him to read and write at one and the same time. He drew the form of the letter either with chalk on a board, or with the finger in sand; and Richard was made at once to understand and imitate the impression. As soon as he could speak, he could trace the letters; and this exercise delighting his fancy, an ardour of imitating whatever was put before him was excited to such a degree, that the walls of the house were covered with characters, which attracted notice, from their neatness and fidelity of delineation.

At nine years of age, he and his youngest brother, Thomas, were sent to the village school, kept by a Mr. Summers, a plain but most intelligent and worthy man; who, having had the misfortune in infancy to cripple his left hand, was educated for the purpose of teaching, and he discharged his duties with the most exemplary attention. He professed nothing beyond English, writing and arithmetick, with the rudiments of Latin He was a good accountant, and an excellent writing master. He perfected the professor in that delightful talent of writing, in which he so peculiarly excelled; but which, we are doubtful whether it was to be considered as an advantage or a detriment to him in his progress through life. It certainly had a considerable influence on his habits, and made him devote many precious moments to copying, which might have been better employed in composition. It has been the means, however, of enriching his library with annotations, in a text the most beautiful, and with such perfect imitation of the original

manuscript or printing, as to embellish every work which his erudition enabled him to elucidate. He continued under Mr. Summers for three years; and every evening, during that time, he had to repeat by heart, to his father, the lessons and tasks of the day; and this, not in a loose or desultory manner, but in the rigorous order in which whatever he had been occupied about had been done; and thus, again, the process of recollection was cherished and strengthened, so as to become a quality of his mind. It was impossible that such a youth should remain unnoticed, even in a place so thinly peopled, and so obscure, as the parish of East Ruston. The Rev. Mr. Hewitt heard of his extraordinary propensities to study; his gift of attention to whatever was taught him; and the wonderful fidelity with which he retained whatever he had acquired. He took him and his brother Thomas under his care, and instructed them in the classicks. The progress of both was great, but that of Richard was most extraordinary. It became the topick of astonishment beyond the district, and when he had reached his fourteenth year, had engaged the notice of all the gentlemen in the vicinity. Among others, he was mentioned as a prodigy to an opulent and liberal man, the late Mr. Norris, who, after having put the youth under an examination of the severest kind, and from which an ordinary boy would have shrunk dismayed, sent him to Eton. This happened in the month of August, 1774, when he was in his fifteenth year; and in that great seminary, he, almost from the commencement of his career, displayed such a superiority of intellect, such facility of acquirement, such quickness of perception, and such a talent of bringing forward to his purpose all that he had ever read, that the upper boys took him into their society, and promoted the cultivation of his mind by their lessons, as well, probably, as by imposing upon him the performance of their own exercises. He was courted by them as the never failing resource in every difficulty; and in all the playful excursions of the imagination, in their frolicks, as well as in their serious tasks, Porson was the constant adviser and support. He used to dwell on this lively part of his youth with peculiar complacency; and we have heard him repeat a drama, which he wrote for exhibition in their long chamber, and other compositions, both of seriousness and drollery, with a zest that the recollection of his enjoyment at the time, never failed to revive in him. We fear, however, that at this early age, his constitution received a shock, which was soon after aggravated by the death of his worthy patron. An imposthume formed on his lungs, and he was threatened by a consumption. But it fortunately broke, and he recovered his health, though his frame was weakened.

The death of Mr. Norris was the source of severe mortification to him; for though, by the kindness of some eminent and liberal persons he was continued at Eton, he felt the loss he had sustained in the most poignant degree. But we do not mean, this day at least, to do more than trace the dates of his progress to the professor's chair. He was entered of Trinity college towards the end of 1777; and, his character having gone before him to the university, he was, from the first, regarded as a youth, whose extraordinary endowments would keep up and extend the reputation of the unrivalled society into which he had entered. Nor did he disappoint the hopes that had been formed of him. In every branch of study to which he applied himself, his course was so rapid as to astonish every competent observer. By accidents, which in a more detailed biographical article will be explained, he was drawn first to read in mathematicks, in which, from his early exercises, he was so eminently calculated to shine, but from which he drew no benefit; and then, by the prospect of a scholarship, which, however, did not become

vacant till long after he sat down to the classicks. In this pursuit, he soon acquired undisputed preeminence. He got the medal of course, and was elected a fellow in 1781. In 1785, he took his degree of master of arts; but, long before the period had elapsed when he must either enter into holy orders, or surrender his fellowship, he had, after the most grave and deliberate investigation, to which he had brought all that acute gift of examination that has been made so perceptible in his letters to Mr. Archdeacon Travis, made up his mind on the subject of subscription. We are sure that his determination cost him many painful and laborious days and months of study. His heart and mind were deeply penetrated by the purest sentiments of religion; and it was a memorable, and most estimable feature of his character, that in no moment the most unguarded, when that ardour of discussion which alone led him to indulgence, had elevated his spirits, was he ever known to utter a single expression of discontent at the establishment, of derision of those who thought differently from himself much less of profaneness or impiety. He was truly and actively pious; but it was of an order that admitted not of shackles. So early as 1788, he had made up his mind to surrender his fellowship, though, with an enfeebled constitution, he had nothing to depend upon, but acquirements that are very unprofitable to their owner. A lay fellowship, to be sure, might have secured his services to the cause of letters; but the disingenuous conduct of an individual withheld from him that resource. In 1791 his fellowship ceased, and he was thrown upon the world without a profession, his feelings wounded by the mortifications he had suffered, and with a constitution little qualified to encounter the bustle of the world. Some private friends however, stept in; and, soon after, he was elected Greek professor of Cambridge, by a unanimous vote of the seven electors. The distinction of this appointment was grateful to him. The salary is but forty pounds a year. It was his earnest wish, however, to have made it an active and efficient office, and it was his determination to give an annual course of lectures in the college, if rooms had been assigned him for the purpose. These lectures, as he designed, and had, in truth, made preparations for them, would have been invaluable; for he would have found occasion to elucidate the languages in general, and to have displayed their relations, their differences, their near and remote connexions, their changes, their structure, their principles of etymology, and their causes of corruption. If any one man was qualified for this gigantick task, it was Mr. Professor Porson; and if his wishes had not been counteracted, we know that he would have undertaken the labour.

From this time, instead of lectures, he turned his thoughts to publication. His letters to Mr. Archdeacon Travis, as has been truly said, put the controversy on the disputed text to rest; and, indeed, it was the peculiar felicity of his mind, that whatever he undertook to elucidate, he fixed for ever in the light.

In 1795, he married Mrs. Lunan, the sister of Mr. Perry, of this paper, but who sunk under a decline in 1797; and, from that time, the professor himself was so incessantly afflicted with a spasmodick asthma, as to interrupt him in every study to which he applied himself. Whether his sedentary habits served to bring it on, we know not; but certainly very few men had accustomed themselves to such patient and continued toil. He had undertaken to make out and copy the almost obliterated manuscript of the invaluable Lexicon of Photius, which he had borrowed from the library of Trinity college. And this he had, with unparalleled difficulty, just completed, when the beautiful copy, which had cost him ten months of incessant toil, was burnt in the house of Mr. Perry, at Merton. The original,

being a *unique*, intrusted to him by his college, he carried with him wherever he went; and he was fortunately absent from Merton on the morning of the fire Unruffled by the loss, he sat down without a murmur, and made a second copy, as beautiful as the first. It is extant in his library, and is quite ready for the press. Of the plays of Euripides, which he published, the learned world has pronounced its judgment, and we reserve for another occasion, an account of this and his other literary labours. It may be pleasant for our readers, however, to know, that he has left an Orestes quite ready for the press.

On the establishment of the London institution, the managers manifested their own discernment and love of letters, by selecting him to be their principal librarian, an appointment for which he was peculiarly qualified, and if time and health had been allowed him, he would have made their library truly valuable. His own, which he has been gradually collecting for thirty years, he has enriched by annotations of such value and importance to literature, that we hope and trust, the whole will be placed in his own college, that it may for ever be within the reach of those whom his example may arouse to similar pursuits, though they may despair of reaching equal attainments.

We have said, that we should feel it our duty to correct some of the misstatements that have gone forth, as to his habits of life, and as to the circumstances of his death; but we have scarcely left ourselves room after this hasty sketch, written since our return from paying the last duties of inconsolable friendship to his remains, to perform the task. Mr. Porson, as we have stated before, has, for the last eleven years, been the incessant victim of spasmodick asthma, during the agony of which he never went to bed, and in which he was forced to abstain from all sustenance. This greatly debilitated his body; and, about a month ago, he was afflicted by an intermittent fever. He had an unfortunate objection to medical advice, and he resorted to his usual remedy of abstinence; but on Monday, the nineteenth ult. he suffered an apoplectick stroke, from which he recovered only to endure a second attack the next day. He languished to the Sunday night, and expired without a struggle. The body was opened by his medical attendants, and they have given a report, ascribing his death "to the effused lymph in and upon the brain, which they believe to have been the effect of recent inflammation. The heart was sound, and the pericranium contained the usual quantity of lymph. The left lung had adhesions to the pleura, and bore the marks of former inflammation The right lung was in a perfect sound state" This is signed by Dr. Babington, Sir William Blizard, Mr. Norris, Mr. Blizard, and Mr. Upton. In refutation of an idle falsehood about the form of his skull, they add, "that it was thinner than usual, and of hard consistence."

Mr. Porson has left a sister living, an amiable and accomplished woman. She is the wife of Siday Hawes, Esq. of Coltishall, in Norfolk. They have five children. Their eldest son is entered at Bennet college, Cambridge. Henry, the second brother of the professor, was settled on a farm in Essex, and died young, leaving three children. His brother Thomas kept a boarding school at Fakenham, was an excellent scholar, and died in 1792, without issue; and his father, Mr. Huggin Porson, died in October, 1806, in his 78th year. His mother died in 1784, aged 57. These few particulars may satisfy, for the time, the impatience of all those who knew his incomparable talents, but who were unacquainted with his private history. We shall hereafter speak of the character of his mind, and of the various attainments in which he had no rival.

THE most remarkable among the intellectual powers of Richard Porson, was unquestionably that of memory. It was at once obvious to every one who had the good fortune to be in his company; and it never ceased to excite the admiration of those who had most frequently an opportunity of conversing with him. Every thing he had read, and what was there worthy, or, indeed, unworthy of literary notice, which he had not read?* appeared to be present to his mind, with uncommon precision. Whensoever a subject connected with English, French, Latin, or Greek poetry was started, he would recite some brilliant and striking passage, at considerable length, in the words of the author. And in the latter language more especially, which was his favourite study, he was so completely master, not only of the words of the author in question, but of every circumstance relating to the words, that he would expatiate upon the various readings, and the points of grammar and criticism connected with them, in such a manner, as to produce the effect of a complete and well digested Variorum Commentary. We remember to have heard him relate one or two incidents which occurred at different, although both early, periods of his life, which will illustrate this quality of his mind far better than any laboured detail.

When he was very young, perhaps at the time when he was under the care of Mr. Summers, returning to his father's cottage, he lost his way, and found shelter in the house of a little farmer, whose son, somewhat older than Porson, had just quitted school. With this boy Porson was to sleep; but, instead of betaking himself to his slumbers, he began questioning his companion concerning what he had learned at school. He found him a most admirable arithmetician, and passed the night in proposing questions, which the other answered to his satisfaction as well as surprise; for at last he found him capable of multiplying nine figures by nine in his head, an operation which was quite familiar to our young professor.

When at Eton, as he was going to his tutor's, to construe a Horace lesson, preparatory to the business of school, one of the senior boys took Porson's Horace from him, and thrust into his hands some English book. The tutor called upon Porson to construe, and the other boys were much amused in considering the figure he would make in this emergency. Porson, however, who had Horace by heart before he went to Eton, knowing where the lesson was to begin, began without hesitation,

Mercuri facunde, nepos Atlantis:

and went on regularly, first reciting the Latin, and then giving the Latin and English, as if he had really had the author before him. The tutor, perceiving some symptoms of astonishment as well as mirth amongst the other boys, suspected that there was something unusual in the affair, and inquired what edition of Horace Porson had in his hand. "I learned the lesson from the Delphin," replied his pupil, avoiding a direct answer. "That is very odd," replied the other, "for you seem to be reading in a different side of the page from myself. Let me see your book." The truth was of

* Upon this subject we have been favoured with the following observations from the respectable writer, to whom we are already so greatly indebted for the knowledge of many interesting particulars.

It was one of the peculiar traits of his mind that it rejected no aliment. He was equally well read in Joe Miller, and the Fathers, as in Greek literature. And in the very lowest, as well as highest branches of human learning, his memory was equally retentive. In his power over figures, though he was at an early age diverted from mathematicks, Mr. P. never knew his equal. His quickness in bringing out the result of a most intricate and manifold calculation by mental working, was magical. He had formed for himself a species of short hand in figures, if we may use the term, that had the most astonishing brevity and truth.

course then discovered; but the master, instead of showing any displeasure, wisely and kindly observed to the others, that he should be most happy to find any of them acquitting themselves as well in a similar predicament.

The sensible and well written memoir, above quoted, accounts in some degree for the extent to which this invaluable faculty of his mind was at length carried; but it certainly must be allowed that very strong original powers, and intense application in after life must have been required in order to secure the attainment of such a blessing. It should be remembered to the honour of the professor, that he never appeared in any degree vain of this astonishing talent; and he once observed to the writer of this paper, "I never remembered any thing but what I transcribed three times, or read over six times at the least; and, if you will do the same, you will have as good a memory." Indeed, he was at all times the warm advocate of a doctrine, which is as true as it is important in the conduct of education. He maintained, that superiority of intellect and of attainments was not so much owing to a difference in the formation of the organs, as in the mode by which education was conducted. And although such a man as Porson could not have failed to have been distinguished for the strength and acuteness of his understanding, under any circumstances, yet it cannot be doubted that the habits of his earlier years contributed much to that force and precision in his memory, for which he was so eminently distinguished.

There were other qualities in this great man's mind, although not so obvious to a common observer, nor so dazzling, yet even more rare and more useful. These were his extraordinary acuteness of discernment, and solidity of judgment; and these, added to his intense application and stupendous memory, made him, what the world, perhaps, never saw before, and, alas! can not soon see again, A COMPLETE CRITICK, in the most honourable and extended sense of that appellation. His reading was, of course, immense. He was an excellent French scholar; but, in his native language, in the Latin, and in the Greek, he was most familiarly and profoundly versed. He had, indeed, applied the knowledge he had gained of the origin and structure of language in general, to all these dialects, if we may so express ourselves, of the universal language; and, had not his eminence in classical literature, by its uncommon lustre, obscured other attainments, he would doubtless have been considered as *one of the first* English scholars. In Greek, however, we have no hesitation in pronouncing him *the very first*, not merely of his own age, but of every other. He is surely entitled to this honourable distinction, when we consider that he possessed at once, each in its highest degree of excellence, all the qualities for which any single scholar has hitherto been eminent. In him were conspicuous, boundless extent of reading; a most exact and well ordered memory; unwearied patience in unravelling the sense of an author; and exploring the perplexities of a manuscript; perspicacity in discovering the corruptions of a text; and acuteness, almost intuitive, in restoring the true reading. All this, be it observed, was tempered with a judgment, which preserved him invariably from the rocks against which even the greatest of his critical predecessors have at some time or other split; we mean precipitation in determining that to be unsound, which after all had no defect; and rashness in applying remedies, which only served to increase the disease.

In thus pronouncing him superiour to Salmasius, Casaubon, Hemsterhusius, Toup, Dawes, and even to Bentley and Valckenaer, some of our readers may, perhaps, be of opinion, that he has published too little to justify this high encomium. To these we must reply in the words of the old proverb, *ex pede Herculem;* and we would boldly refer to the four plays of

Euripides, with the preface and supplement, as the work of a critick, soaring in genius and in attainment above his predecessors. When, moreover, we appeal to those exquisite specimens of profound knowledge and critical acumen, which he so liberally communicated to his friends, we have no hesitation in giving it as our opinion, that what is yet unpublished is equal, both in value and extent, to that which has already been submitted to the world. And we have only to express our most ardent and decided wish, that some steps may be immediately taken, in order to collect all the remains of this admirable scholar, for the purpose of publication; whether they be recorded in the memories and books of his friends, or whether they be treasured among his own literary κειμηλια.

In the enumeration of those qualities which contributed to raise this wonderful man to such a proud preeminence, it would be unpardonable to forget the point and brilliancy of his wit. It is difficult to define this faculty as it exists in any mind; but it is peculiarly so as it appeared in that of Porson, on account of the variety, as well as beauty of the forms it assumed. At one time it was the happy talent of enlivening and illustrating a subject by a peculiarly apt and dexterous quotation;* at another. it scattered at will the Attick salt, which gave so much vivacity to the controversies of Bentley, and which diffuses such peculiar splendour over the polemical gloom of the Letters to Archdeacon Travis; at other times this superiour genius wielded the more concealed, but caustick weapon, which probed to the quick the follies and the vices of mankind in the satires of Swift. Such, and so various, were the powers of Richard Porson, that by turns we are in doubt whether we have been more fascinated by his wit, or astonished at his learning.

To these intellectual excellencies, faintly and imperfectly as they are portrayed, were added strong and admirable moral qualities; the most inflexible spirit of integrity; a most inviolable regard to truth; and their necessary concomitants, the most determined independence. By precept, as well as example, he discountenanced all violent emotions of the mind, and particularly that of anger. His sentiments upon the subject of religion it was difficult, at least for such persons as did not enjoy opportunities of frequent and familiar intercourse with him, to collect with precision. We are, however, enabled to state, as the decided conviction of those who were more particularly honoured with his confidence, that his faith was steady in the pure and consoling truths of Christianity. In his interpretation of some parts of the sacred volume, he certainly differed from the church of England; but his dissent was unmixed with any tincture of undue or schismatical warmth in favour of a system, to which, after mature and painful deliberation, he felt himself bound to adhere. For the name of God he ever observed the most pious reverence; nor ever would he suffer it to be profaned in his presence. Obscene language was in an equal degree the object of his antipathy and disgust.

He undoubtedly had a warm sense of kindness to himself; and felt more than he expressed of benevolence towards others! Of every thing mean, base, insolent, treacherous, or selfish, whether practised towards others or towards himself, he had a quick discernment and a most rooted abhorrence; and the terms of bitter contempt, or of severe indignation, in which he

* He once said that he wished to be called upon for a second edition of his Letters to Travis, and in that case he meant to prefix this as a motto:

Quo, moriture, ruis, majoraque viribus audes?
Fallit te incautum *pietas* tua.

expressed himself upon such occasions, may have given rise to opinions concerning the real bent of his feelings, which those, who had frequent opportunities of observing him, can safely pronounce to be unfounded.

From this attempt to show the cast of his moral character, it appears, that as the features of his mind were robust, so were the virtues of his heart stern. Indeed, in many of their better points, he has frequently reminded us of the old Stoicks; but if he did take Cato for his model, it is seriously to be lamented that he imitated him in one of his defects.* We have no doubt that the *tempestiva convivia*, in which the professor loved to indulge, owed their origin to a sleeplessness first brought on by habits of study, and subsequently increased by indisposition; but whatever was the cause, deeply do we deplore this additional instance of infirmity attached to the greatest and most shining excellencies. We must, however, carefully guard our readers from supposing that this eminently learned man was habitually addicted to the use of strong and heating liquors. When alone he was singularly abstemious. And again we must urge the observation that his late hours were not occasioned by the *vice* of intemperance, but by the *misfortune* of his inability to sleep. His usual and favourite beverage upon these occasions was table beer; and continually would he pass the night, charming and instructing those who sat around, without the slightest advance to inebriety. But sometimes the officious zeal of his less discreet companions would supply temptations, against which he was not sufficiently upon his guard; and towards the latter part of his life, his frame, undermined as it unhappily was by the corrosions of disease, could ill sustain, and consequently betrayed, the least indulgence. Yet be it observed that, in no moment of gayety, carried even to a faulty excess, did he ever lose that reverence for the name of his Creator, and that loathing of obscenity, which we have already mentioned as honourable characteristicks of his moral tendencies. Never did he swerve from his undeviating attachment to truth, nor ever was he known to betray a secret.

October 17, 1808.

BRITISH IMPROVEMENT IN THE MANUFACTURE OF SWORDS.

PREVIOUS to the year 1795, the scientifick principles on which swords should be constructed, were deplorably neglected. Every regiment was at liberty to order its own swords, without reference to any standard, or proof of their goodness. A weapon so important both for offence and defence was left to chance or caprice, and the consequence was, the sacrifice of many a brave fellow, and an unascertainable loss to the service and the country. At that period the board of ordnance requested the trade to produce patterns of swords, together with the best modes of proof, in order that the highest degree of security that art and industry could provide, might be obtained. Accordingly each sword-maker produced his pattern, his price, and his method of proving. On accurate examination, Mr. Osborn's system of proving, mounting, &c. was adopted, and established by the board, and general Ross, surveyor general of the ordnance, desired him to lay down explicit directions for the guidance of the sword-cutlers employed by the board.

* Mart. Epig. Lib. ii. 89.

In conformity with this application Mr. O. invented a proving machine, which was exhibited by request before his royal highness the duke of York, general Ross, colonel Le Merchant, and a number of field officers, at the war office, and was unanimously pronounced to be effectual, simple, and calculated to answer the important purpose of an unerring system. He was then ordered to make nine such machines for the direction of other sword manufacturers, and one of them was fixed in the Tower, and a proper person appointed to look to the proof agreeably to rules laid down.

This regulation, though salutary, being strict, produced a few ineffectual murmurs on the part of other sword manufacturers. The establishment of these regulations has been the happy means of saving the life of many a brave man; for there is now little danger of the sword falling fractured and useless from the arm of valour.

Previous to this establishment, the army were chiefly supplied from Germany; but the German swords were, and are so ill constructed, that they would not, and will not, sustain this criterion. Some few that were ordered by the board, and were procured from the German resident in London, were shivered to pieces, when submitted to the test, and from their repeated failures, no German swords have, for several years, been received into government stores, and no swords whatever, but such as would, in every respect, endure this proof.

In consequence of these successful exertions, Mr. O. was honoured with a recommendatory letter from a gentleman of the highest respectability, and high in office, to the then chairman of the committee of the honourable East India Company, who, among other handsome things, says: "I have great pleasure in saying, that in the course of the last four or five years, he has supplied the ordnance with near twenty thousand cavalry swords. Mr. Osborn would readily agree that all the swords that he should furnish to the company, should be examined and proved at the Tower, and it would, no doubt, be much for the advantage of your service that they should undergo the strictness of our examination."

The honourable East India Company caused an order to be given to the German resident in London, and Mr. O. for each to produce ten regulation light cavalry swords, to be publickly tried at the Tower, under the inspection of major Cunninghame. The trial of workmanship therefore took place on the 7th of November, 1804; but as the German found, by having his swords secretly proved, that they would not stand the slightest proof, he did not think proper to attend.

A regulation light cavalry sword is 32 1-2 inches long in the blade, and should spring one inch in every six, viz. 5 1-2 inches, which will take it down to 27 inches. Several of the swords were sprung to 22, 21, and 20 inches, which was 5, 6, and 7 inches beyond proof, and all beyond 27 inches was considered as being superfluous; but the parties wished them put to the utmost test. Hence the reason why they were continued to be sprung till one or the other lost its elastick powers. The moment a sword becomes soft [set] or breaks, it is disabled. The process of proving is as follows. After being ground to a guage, and weighed to see that they are conformable to the scale they are struck back and edge over a block of wood. This is called chopping. Then they are struck flat-ways on an even surface of wood. This is called slapping. And, finally, they are sprung to 27 inches. Every *warranted* sword undergoes this proof, and which is considered equivalent to every hardship a sword undergoes in the field of battle.

SWISS MILITARY SYSTEM.

To the Editor of the Literary Panorama.

SIR,

SOME years ago, during a long residence in Switzerland, I was much pleased with the admirable dexterity with which the whole male population of that country used the rifle ; but much more with the admirable policy of the government, which by this means had contrived to establish a most formidable military system, interwoven with the national amusements of the people. It was attended neither with expense to the community, nor inconvenience to the individual ; the whole service was voluntary, and honour and emulation were the only compulsory principles called into action. It may be well understood, how necessary it was to the ancient Swiss republick, surrounded by powerful neighbours, to have a large military force at all times in a constant state of preparation. The country being small, nothing short of a levy including the whole male population, would answer the purpose ; and as to the keeping up of such an establishment, as a standing army, that was completely incompatible with the safety and welfare of the state. What then were the institutions adopted? Each town, city, and village, at certain stated times of the year, gave honourary distinctions and prizes, to such as entered the lists, as rifle shooters. They varied in value, in proportion to the rank attached to the places which gave them ; thus, the prize given by a city was thought a more honourable mark of distinction, than that given by a village, and so on.—The consequence was, that practising at a mark became quite the national game, if it may be so called, and a child, from the moment it could go alone, was accustomed to see its parents and relations striving in this manner for the palm of victory.

Thus, instead of adjourning to the tavern, or the publick house, to spend their evenings, as is too much the case among ourselves, all ranks rendezvoused at the shooting ground of the place.

The shooting ground and abutments were considered as publick property, and the publick was at the expense of repairs and other contingencies, subject to the jurisdiction and direction of the principal inhabitants of the place.

The utmost exertions of an individual, for introducing a similar arrangement into this country, must prove fruitless, unless assisted by the publick journals, and periodical works, which by their sanction would tend to force it on the attention of our rulers ; but were government to patronise the measure, I feel confident it would prove of the highest utility. Taking the metropolis alone, fifty guineas given away in prizes would excite an amazing emulation among those who have already chosen that weapon ; but whose ardour is much less than it would be if stimulated by some publick incitement. This measure, if adopted, would place the defensive means of the country on a most efficient footing, leaving at the same time a much larger disposable force for foreign service.

DR. GALL AND HIS HYPOTHESIS.

To the Editor of the Literary Panorama.

SIR,

OBSERVING in your last number of the Panorama that Dr. Gall was arrived at Paris, whence we certainly shall hear more of him, and being desirous that every system proposed by an intelligent man, should have justice done it, I take the liberty of submitting to the publick, by your means, an outline of that physiologist's hypothesis. My design is, on one hand, that it should not be scouted without reason; and on the other, that it should be submitted to the closest investigation by your ingenious readers.

Dr. Gall considers animals as being born with the dispositions or faculties proper to their species; but these faculties have not equal power in every individual. The brain is the seat of the mental faculties: but it is not a simple organ; it is a combination of organs, each of which has its particular disposition. The size of the organ is proportionate to the intensity of these dispositions, and these organs are manifested on the *outside* of the cranium, by protuberances which correspond in form to that of the portion of brain which they enclose. In short, the bony case of the skull is conformed to the internal contents, so that by knowing one we know the other, as to shape. The bony covering not only receives this form while it is soft in infancy, says Dr. Gall, but it yields to the impulse of the internal parts as they grow, and "the lymphatick vessels absorb part of the bone itself, which is regenerated by other vessels which issue from the membranes of the brain."

The difficulty in supporting and applying this theory is, to determine what particular part of the skull corresponds to any certain disposition of the person. This was partly ascertained by the examination of animals. Dr. Gall places the organ of *goodness*, for instance, on the upper part of the head. It is indicated by a protuberance in the middle of the forehead, where the forehead begins to flatten. This protuberance is found in sheep; and in goodnatured dogs, and horses. It is even said, that jockies pay attention to this part, when buying of horses. This protuberance is wanting in cats, in the hyena, the crocodile, and the bull dog; also, in the Caribbee Indians. and, if the Dr. may be credited, it was wanting in Robespierre. He also affirms, that according to the absence or presence of this *bump*, he has distinguished to a certainty, amid a whole herd of cows, which was good, and which was bad. The fox, the cat, the panther, the hound, among animals, and, among men, the diplomatists, the comedians, and the authors of well conducted and intrigued novels, have, on the sphemoide angle of the parietal bone, a very distinct prominence, which is the organ of *cunning*. That of *theft* is close adjacent, and is almost always connected with it. "It has never been absent in any thief who has been examined in the different prisons." How far the diplomatists, comedians, and novelists, may feel themselves flattered by this connexion, must be left to their own sensations to decide. The organ of the *fighting* propensity is marked, says Dr. Gall, by a globular rising at the posteriour and inferiour angle of the bregmatick bone, where it touches the bone of the temples. This is found in courageous animals, but not in the timid, as hares, &c. Dr. Gall found it in general Wurmser; but not in the poet Alxinger, who was a fearful man. Yet the poet Alxinger was a *friendly* man, though the Dr. did not find in him, the organ of *friendship*, which he places above the andaidal suture of the parietal bone. He found this organ in dogs, and in some men and women.

In the whole, Dr. Gall has distinguished *twenty-seven* organs, with some degree of certainty. His thought, to say the least of it, is ingenious. That there are such points on the human skull is undeniable; and though the difficulty of appropriating them is confessedly great, yet science may demonstrate that it is not insuperable.

I am, sir, yours, &c. INGENIOSUS.

THE CITY OF BAKU, AND ITS NEIGHBOURHOOD.

The following curious account of the city of Baku, and *Place of Fire* in its neighbourhood, is extracted from Wilkinson's Historical and Topographical Description of Mount Caucasus.

SEVENTEEN versts S. S. E. of the river Agahbdal stands Baku, or Badku; built in the form of an obtuse triangle, and called the *Holy City* by the Gebers or Guebres (who are styled *fireworshippers*) and considered as one of the great mercy seats of the Indian Brahmans. It lies twenty-two versts from the southern arm of Caucasus, in a flat hilled plane, devoid of river or stream, and near the sea. It is surrounded with a ditch, and thick strong walls, and supplied with cannon and mortars, of which no one there understands the use. It must formerly have made a better appearance, and been better built; for we meet with many respectable ruins and caravansaries, near the mountains, where the old city extended to. The Gebers cannot sufficiently praise their former greatness and wealth. Before Persia had changed the true religion for the Mahomedan, they say, the city was annually visited by many thousand men. They do not reckon the total ruin of it before the death Usunn Hassan, king of Persia. There are still, however, many respectable mosks, houses, bazars, and caravansaries, which stand so near the shore, that ships may be laden and unladen from them; and yet, with all these great conveniences, and an excellent harbour, commerce is entirely neglected.

The neighbourhood of Baku has many and various charms, but they must not be visited in July, August, or September; for in those months the whole country pines under the oppression of heat, and the arid soil bursts asunder; but in spring or autumn, when it is adorned with rich enamelled meadows and fertile fields; on which account, the whole Hyrcanian territory, as far as Muskurr, is called "The Paradise of Roses."

Not less remarkable is the noble view round Baku. Towards the sea and the neighbouring islands, it is delightful. To the south, one discovers other countries and verdant mountains, separated by the Kurr. To the westward is the southern arm of Caucasus, stretching far to the eastward, which serves the inhabitants as well for an object, as to mitigate the heat. For when the strong, dry east and south winds blow on those mountains, and return cool in the evening with quickening balsamick power, from numerous fruit-bearing trees, and full of the perfume of so many thousand different flowers, an uncommon sweet sleep seizes the weary traveller; and he feels, on awaking, lasting and pleasant beguiling sensations, which other countries afford much more sparingly.

The neighbourhood of Baku must contain an incredible quantity of mountain oil; for in Balaghan, the name of the district of some villages twelve versts from Baku, twenty-five oil wells are open. They often dry up, and then new ones are obliged to be dug; but the old ones are carefully kept open some time, because the spring, after a few months, generally makes its appearance again.

The inhabitants of Balaghan undoubtedly compute the measure of oil too high, when they say, that the deepest and richest wells yield every day between 1000 and 1500lb. It is true, they draw out, two or three times a day, some buckets full; but, according to my reckoning, the bucket does not contain more than 230lb. Thus much I am certain of, that other wells only yield from 50 to 80lb. daily. If the less abundant wells are not emptied every day, the increase of oil ought to be greater; but in the main well its daily measure ought not to exceed it; therefore that one is emptied every day; but the others are only emptied once a week. The prince of Baku has retained the sole right of selling all the oil; thus, when more is drawn in Balaghan than there is a sale for, it is sent to Baku; and as they have no convenient casks, or storehouses for it, there is a place without the city containing fifteen deep pits. In them the overplus is preserved, until it is again drawn off for sale. The colour of the oil is quite black; but if poured out against the sun, it appears redish. It does not light very quick, but when once in flames, emits a clear light and much smoke. The inhabitants of that neighbourhood, and along the Caspian, use it as well in their lamps, as in flat, broad, iron pans, filled with sand, into which the oil is poured and lighted. They also paint the terrace-roofs of their houses with it, to prevent the rain from penetrating; and in summer, buffaloes are smeared all over with it, to protect them from the very dangerous horse flies and gnats.

Not far from thence, at the foot of a hill, is a well of white oil. This lights very quick, even on the water; on that account the inhabitants amuse themselves with throwing some *pattmans* [8lb.] of it into the bay; or, during a calm, into the channel between the small islands, and lighting it at the dusk of the evening. The gentle beating of the waves does not extinguish the flame, which spreads considerably, and the water appears to blaze. A *pattman* of this oil, called *white naphtha*, costs one rouble sixty copeeks. The middling classes use it for lamps. It is also sold to painters; and generally serves as a domestick medicine for many disorders. In gouty cases, and rheumatick pains, it is employed with great success.

Four versts east of the naphtha springs, is a place particularly remarkable; and the only one in this sandy soil. It is called *Ateschjah*, or *Place of Fire*. As soon as one approaches, a very sulphurious smell arises. The diameter of the place exceeds something more than a verst; and from the centre, in dry weather, a strong, yellowish-blue flame is emitted, that increases in the night.

At some distance from the flame, but on the same spot, Indians, whom I before called Geber, Gueber, or *fireworshippers*, and other poor persons, have erected small stone houses. The space of ground, enclosed by the walls, is covered with loam a foot thick, that the flame may not break through. But where an inhabitant thinks fire necessary, he leaves incisions or holes in the floor; and when fire is wanted to boil his food or coffee, he holds a light over the opening, and immediately a flame arises, which is employed more conveniently than common wood or coal fire. The flame completely fills the opening, were it ever so large; but the narrower it is, the greater is the force and heat of the flame. From an opening of two inches it reached three feet ten inches in height, and afterwards fell down to two feet five inches. When fire is no longer necessary, the hole is pressed down, after the flame has been extinguished.

The hole in the loam floor, from which the flame rises, certainly heats, but its edges suffer no change. When the fire breaks out and burns, a sulphurious vapour is smelt, and a strong current of air continues after the

flame is extinguished. Whoever then holds his hand, for some time, over the opening, feels at first a rising warm air. At last the skin becomes warm, red and swollen, and the exhalation is perfectly similar to that of warm sulphur baths. But the fire is not merely confined to the houses; it is every where at hand.

In dark nights, the inhabitants procure light by means of that fire. In a narrow hole, bored through the loam floor, they fix a reed, whose inner surface must be completely coated by limewater frequently poured through it. The outer edges, below and above the opening, are covered with the same substance, and the reed stuck into the hole. When it is all dry, they apply a burning paper to the upper end, and immediately a steady flame bursts forth, almost six inches high, which serves instead of the clearest light.

The poor Indian linen-weavers who live there, as soon as it is evening, set fire to those reeds, and on both sides of the weaving stool similar ones are placed; and the workman has neither to keep up the flame, nor snuff the burning wick. Firing is also unnecessary, for the heat is so great, that the windows and doors always stand open. Besides, it is very dangerous to light a wood fire, without sufficient caution; because the whole neighbourhood might be in flames, of which melancholy accounts are related. The current of air rushing from the incisions or holes is strong. Leathern bottles and flasks are soon filled with it, and this confined air is inflammable for some time after. I saw a proof of it at the prince of Schammaghi's, who ordered a leathern bottle full to be fetched for my satisfaction; and though the messenger was obliged to make a long circuit, on account of the Lesghaes, and did not return before the fourth day, yet it was still inflammable. The Gebers, besides, assert that they send casks full of it to India, which ignite even at that distance.

The inhabitants not only use the fire for domestick purposes, but likewise for burning lime.

After digging to the depth of four or five feet in the neighbourhood, and particularly round Baku, very cold water, tasting strongly of naphtha, rises from a gravely soil; and even the loam-hole, from which a strong current of warm air burst forth at first into flames, serves no longer, as soon as they have dug to the given depth, and got water. But if the loam soil only is bored through in another part, from six to eight inches distant from the place where the water rises, the abovementioned current of inflammable air rises again immediately; and is not diminished, although the clearest water is drawn off with a reed near the rising flame. As soon as the spring is exhausted, a passage is again open for the inflammable air. The naphtha-taste of the water does not prevent the inhabitants of Baku from using it. It is by no means injurious to the health, and the traveller no where feels a greater appetite, than when he drinks that water.

Besides this consuming fire, there is another near Baku that does not inflame. After warm rains in autumn, if the evening is also warm, the fields round Baku stand in full flames. It often appears as if the fire rolled down from the mountains, in large masses, with incredible velocity; and frequently it remains on the same spot where it first appeared. In October and November one often sees, in clear moonlight nights, a very bright, blue light, that covers and illumines the whole western range of Baku. Most frequently the mountain *Soghto-ku* is covered with a similar appearance remarkably splendid, which does not extend to the plain. But if the nights are dark and warm, innumerable flames, sometimes single, sometimes in masses, cover the whole plain, and then the mountains are obscured. They often excite great alarm amongst the horses and mules of a caravan; but de

not last beyond the fourth hour of the night; and if there is a strong east wind, they are not seen at all. This fire does not burn, and if a person finds himself in the middle of the flames, no warmth is felt. The dry grass and reeds are not burnt, though the whole soil appears to be full of devouring fire. On the outside of an exhausted receiver, the fire hangs for some minutes, like a phosphorick light. And although the flame on the ground is extinguished, yet glass tubes, having their air exhausted, appear for some moments strongly illuminated. It should seem that the mixture of this light is different from the species of vapour called *Ignis fatuus;* for this is of a dark red colour; on the contrary, the other is a whitish blue light.

Hindoos come from India [Moultan] to pay their devotions, and perform austerities of various kinds, in the presence of these natural fires.

RIFLE CORPS.

EVERY marshal of France has, with his division of the army, a corps d'élite of 2000 riflemen, who never miss their mark at a distance of 150 paces. Should the army be concentred for a general engagement, these riflemen compose a separate corps of 16,000 men, who are formed two deep, and are posted in the place where the enemy's line is to be penetrated. This corps d'élite generally fire irregularly, but every shot brings down its man, and in a few minutes a whole line of the enemy is destroyed. When two, three, or four lines are thus disposed of, the cavalry and infantry pass through, the riflemen enter the openings in the enemy's line, and attack the corps in both flank and rear. "This system," say men of information, "will continue to conquer, till its opponents possess an equal number of equally good marksmen; for without them, if both armies were equally well commanded, success would only be the work of chance."—Beside this corps d'élite of riflemen, every marshal has, in every company, several expert marksmen, who never miss their man, whose only duty is to pick off the artillerymen and officers in front; but, above all, the commanding officer, which they are able to do at 150 paces. Beside the strong train of artillery, each marshal has, with his division, two battalions of horse artillery, to act with his corps d'élite of riflemen, who equal them in the rapidity of their manœuvres, and quickness of their fire. These battalions are very seldom separated, but are masked by cavalry and sharp shooters. Each marshal has also a corps of Voltigeurs, who are practised to climb walls, leap ditches, and are taught to vault behind the cavalry, by whom they are carried to the place of action, when they dismount, and take post in the thickets, and behind walls and hedges. In the general attack, the above mentioned corps d'élite of riflemen, mounted rangers, and horse artillery, of all the divisions of the army, are assembled for the purpose of breaking the enemy's centre. by which, in the engagements of the two last years, the fate of the day was determined.

INSTINCT OF PIGEONS.

To the Editor of the Literary Panorama.

SIR,

YOU have done me the honour to insert several instances of animal sagacity, that I submitted to your opinion; but, I think that nothing on the subject can be more striking than a passage in Captain Carleton's memoirs which are lately republished. I have, therefore, transcribed it, and do my-

self the pleasure of sending it to you. Pigeons, we know, are not birds of courage. We are not, therefore, to wonder that they take to flight, during an engagement, especially a general engagement of two large fleets, fought by combatants so obstinate as the English and Dutch. But it may be amusing to notice the difference of their conduct from that of the game cock, on board lord Rodney's ship, on the famous twelfth of April. This noble fellow, being by some accident loose, took his station on a coil of ropes, on the quarter deck, near to the admiral, and on the firing of every broadside, he crowed with all his might and main; as if he fully comprehended that this was an effort against the enemy, in which he concurred with all his heart. This champion is immortalized, by being painted in Gainsborough's picture of admiral lord Rodney, by whom he was highly valued:—as who would not have valued him highly? A lady who peeps over my shoulder while I write, desires I would ask, what support these facts may afford to the doctrine of pre-existence and transmigration of souls. She inclines to believe, that in some earlier stage of their existence, the pigeons had been land-lubbers; perhaps haberdashers or men-milliners; whereas the cock had been a jolly tar, a boatswain, or perhaps a captain in the royal navy, and was now doing what he considered as his duty in attending, and cheering "his honour the admiral." Submitting this to your discretion,

I am, &c. HERMIT.

"I cannot here omit one thing which to some may seem trifling, though I am apt think our naturalists may have a different opinion of it, and find it afford their fancies no undiverting employment in more curious and less perilous reflections. We had on board the London, where, as I have said, I was a volunteer, a great number of pigeons, of which our commander was very fond. These, on the first firing of our cannon, dispersed, and flew away, and were seen nowhere near us during the fight. The next day it blew a brisk gale, and drove our fleet some leagues to the southward of the place where they forsook our ship; yet the day after they all returned safe aboard; not in one flock, but in small parties of four or five at a time. Some persons at that time aboard the ship, admiring at the manner of their return, and speaking of it with some surprise, sir Edward Sprage told them, that he brought those pigeons with him from the Straits; and that when, pursuant to his order, he left the Revenge man of war, to go aboard the London, all those pigeons, of their own accord, and without the trouble or care of carrying, left the Revenge likewise, and removed with the sailors on board the London, where I saw them: all which many of the sailors afterwards confirmed to me. What sort of instinct this could proceed from, I leave to the curious."—*Memoirs of Capt. Carleton*, p. 11.

FROM THE LITERARY PANORAMA.

Investigation of certain passages of Scripture on principles not hitherto adopted.

IT may readily be granted that any tract published by an apostolick man, in the early Christian church, would be circulated among the Christians of those times, with great despatch, *immediately* on its publication. This is a natural and indefeasible position, since it arises from a principle in human nature itself. It is natural, too, that, in those times, it should be copied without delay in such churches as were then extant. And this *first* edition would be circulated to the widest extent, of course. Churches that where established afterwards were more likely to receive the *second* edition of such a writer's works; especially, if they had intercourse with

the town where he resided in his latter days, and drew their copies from thence, immediately. But I think we may say, that for one copy of the second edition that was circulated, there would be 20, or 50, or 100 copies of the first edition; since not only would it have the advantage of priority, but not one reader in a hundred would think of the second as different from the first. And this has led our translators to mark, as *doubtful*, the first quotation which I selected from the first Epistle of John, in my last; chap. ii. 23. I have no doubt on the genuineness of the *addition;* but possibly there may be 50 copies without it to *one* which contains it.

Admitting, then, the residence of St. John be at Ephesus, or any part of Asia Minor, for the last thirty years of his life, for which we have the testimony of ancient history, we may date his first epistle, early in that period: or even before he came to live there. This would spread *first*, among the neighbouring churches in Asia Minor: *secondly*, eastward, to those countries which professed Christianity, Antioch, for certain: Syria, Cilicia, Pontus, Cappadocia, Galatia, Babylonia, &c. Toward these countries, there are caravans which go every month, or six weeks, from Asia Minor; there is a regular intercourse maintained, between Smyrna, and the internal parts of Asia Minor, and on through Tarsus to Antioch:—from Ephesus to Smyrna was easy. We have every reason to affirm, that it was the same anciently, and therefore, there was an *immediate* conveyance of such addresses as the apostle John published for the general use of all Christians, from Ephesus, eastward to the oriental provinces of the Roman empire, where Christianity was settled and flourished. In these churches his writings would be in request. Moreover, these churches would be the first to translate his writings into their current language, for the use of the natives of these provinces, who did not understand Greek (which, however prevalent the Greek language was, must have been many) because here was a great number of professing Christians, who desired to be acquainted with their contents.

It is evident, therefore, that these translations, having for their basis the *first* edition, can be no evidences of what the apostle thought proper to add in his *second* edition. The Syriack version, for instance, if we suppose that to be the earliest of all, would represent the *first* edition, as would also, all versions made from it, and all copies made from those, at that time, received in those parts. Whereas, the Armenian version, because it is much later, would at least stand the chance of obtaining (and being made from) the *second* edition. The Syriack version, therefore, is no evidence against an *addition*. The Armenian version is an evidence *for* it. This version contains 1. John. v. 7.

Also, the churches in Africa were not planted till many years *after* those of Asia; their intercourse with Ephesus, being by sea, was irregular, and could only take place, occasionally, if it was direct. If we suppose it to be, on the subject before us, through Italy, then it was subject to the same circumstances as attended the intercourse between Ephesus and Rome. I say Rome, because we have no reason to think that there was any number of Christians, worth mentioning, in any other city of Italy. The apostle Paul, when travelling from Rhegio upward was met by brethren *from Rome:* which when he saw, he thanked God, and *took courage*. Certainly, then, he had not met with many friends in places that he passed through, and his courage had been somewhat cast down, for that reason. We find no trace of Christianity in Herculaneum, one of the cities of Italy, of the second size, which was destroyed A. D. 79, though we meet with traces of Judaism there; and in short, it must be admitted, that, compared with Asia, the western pro-

vinces had but few Christians. We have no reason to think that Rome sent out missionaries early. The south of France was christianized from Asia, though so much further off than Rome. The natural inference is, that these parts would receive *later* copies of any apostolick writing, published in Asia Minor, than those parts which had a regular intercourse, half a dozen times in a year, at least, but probably much oftener, with Ephesus. And whatever versions were extant in the west, would represent the second edition with its variations, whatever they might be.

As to Rome itself, I infer, that that capital of the empire had, if any place had, *both* editions. Suppose, for a moment, that the *first* edition had reached Rome, when Aristobulus quitted that city for Britain, or that it was sent to Aristobulus, in Britain, from Rome, it will follow, that the ancient British copies would *not* contain those additions which the apostle John inserted in the *second* edition. And to this agrees the fact: for Pelagianism could hardly have been repressed by any text more effectually than by the one in question. Yet that errour rose in Britain, and it was not so decidedly opposed then, as it is now; *minus* the testimony of this text. Moreover, the text is not quoted by the venerable Bede, in a passage of his works, where we should expect to find it, at least, alluded to. He, therefore, might have the first edition.

In short, almost all the arguments employed against the authenticity of the text may be admitted. They cease to have any great force, after it is once conceded to those who use them, that the *first* edition, together with all its representatives, in the first century, suppose, had not the words in debate. They are reduced to the infirmity of a negative argument, at best.

I must now observe, that the African churches being planted long after the Asiatick, they, no doubt, would obtain the best transcripts of the works of any inspired writer, which could be procured about the time of their being founded; i. e. the *second* edition of the letter under consideration. To this agrees the fact; *the African bishops quote the passage.* Tertullian, Cyprian. Eucherius, Eugenius, with his consistory of 400 bishops, Vigilius, Fulgentius, &c. &c. so that it was undeniably extant in their copies from the second century downwards. The argument, then, is reduced to a point: either these divines *found* the passage in their copies, or they *put* it there. The latter alternative is so dishonourable to Christians and to Christianity, that one is willing to accept of any hypothesis which may vindicate professors and teachers from such enormous guilt.—But further:

I have said, that Rome might be expected to procure whatever was most excellent in Christian literature, as well as in other studies. It had, then, the *first* edition, because that was the *earliest* which could be procured; and the *second*, because the influx of persons to Rome from all parts was so great, that every thing which was portable of a literary nature, might be expected to be brought there. Rome had an ancient version of the scriptures, known under the name of the old *Italick version.* It is not of any consequence to our argument, whether this version contained the text of the *heavenly witnesses*, since it was made very early; but if the *revised* Roman version of the New Testament contained it, we are reduced to the same dilemma as before, in reference to the African bishops—The reviser of this edition (Jerom) either *found* it, or *forged* it. The same arguments that relieve the characters of the African bishops, relieve the character of this father. The accusation is incredible. It is loading the party with a crime so far beyond ordinary culpability, that the mind revolts at the charge. It is admitted, then, that the Latin version reads this verse; that St. Jerom adopted it; that it was adopted by the learned after

him; as by our own famous Alkwin, at the time, and in the court of Charlemagne, and has so continued ever since. The inference is, that St. Jerom preferred the authority and text of the second edition, and followed it.

These, moreover, are *independent* witnesses; for, the African bishops, who wrote before Jerom, could not receive this passage from his revised version: or, if any choose to affirm that the African bishops received this passage from the old *Italick* version, then the authenticity of the passage follows of course, in proportion to whatever importance is attached to this increased antiquity.

Let us now suggest a few thoughts on the nature of the passage itself, as connected with our views of it. We have seen that all the variations in the second edition by St. John, are *additions*: and we can very easily conceive, from the knowledge we have, of the gnostick and other heresies, then beginning to spread, that twenty or thirty years might see a considerable difference in the opinions, and floating notions of Christian communities. An opinion which was not so much as broached A. D. 70, or 80, might become sufficiently popular to be entitled to notice, reproof, and correction, in A. D. 100. Admitting, then, that the longest liver of the Apostles would endeavour to preserve his readers from the contagion of errour, either incipient, or advanced, he could not do it, by *expunging* any part of an inspired work; since that would be to accuse inspiration with having been the cause of errour; but he might do it, by *adding* to his own works, by *strengthening* former sentiments, or by enlarged or by explanatory expressions so arranged as to meet the mistake in question. This enlargement was the way of our Lord himself. We have seen that it was the way of St. John in other instances; and if in others, why not in this?

We have seen, also, that the *placing* of the verses containing other *additions*, in our present copies, is incorrect: arising, most probably, from the *addition* being inserted on a first edition MS. in the margin; but brought in erroneously, as to its true situation, by the transcriber who next copied that MS. The same I apprehend, is the case here; I confess myself to be of opinion that those copies which place the 8th verse before the 7th are right. It is well known, also, that copies vary in the words they introduce: some insert the words "on earth," and "in Heaven:" others omit them; some omit, "water;" some omit "the Word:" and, I might, did I not think it would tire your readers' patience. treat them with a long and delectable discourse, on the Greek accents, articles, &c. inserted or omitted in this famous passage: but, it is enough for my purpose to say, that these variations are *proofs*, in my estimation, that the *addition* has been made on first edition copies, and introduced with more or less skill, or convenience, &c. &c. according to the ability of the possessor of those copies.

Your readers, sir, will distinguish between what I verily think to be founded on fact, I mean the foregoing statement, and what I am about to submit as conjecture only; I mean the following view of the passage. Nay, I must even apologize for some of the language I am about to use, by saying, that I use it not strictly, but for the purpose of conveying my meaning. Let us, now, attempt to show the propriety of introducing this addition, in opposition to the sentiments of those who considered the Christ, as consisting of one nature, only, i. e. the human: but who denied the residence of the other nature, i. e. the divine, in the humanity; which combination we hold to be necessary to constitute the Christ.

Who is he, says the apostle, *who overcometh the world, unless it be one who believes that Jesus* [the humanity] *is the Son of God? This* [Jesus the humanity] *is he who came* into this world *by* assuming the component parts of

human nature, 1. *water*, i. e. animal life; *and* 2. *blood*, i. e. a body. [Some copies read *caro* or *carno*. Vide Simon, Crit. Hist.] Such is JESUS THE CHRIST: who came, *not by* assuming *water*, animal life, *only*, being a mere phantom, as some pretend, *but by water*, life, *and blood*, a body, also. However, the assumption of both these two principles, though necessary, yet would not qualify him effectually for his office, which was, to bear witness of God; for an animal may have life and a body, yet it is incapable of bearing witness: no; *but the* intelligent and immortal *spirit*, is *that* part of a man, *which beareth witness*, since it only is capable of understanding. *And these three* principles *are those which bear witness on earth* [i. e. which compose the humanity] *the* intelligent *spirit, and the water*, or animal life, *and the blood*, flesh, or body, *and these three agree in one* testimony; [or rather, *these three are* necessary to be *combined into one* person, in order to enable that person to bear testimony; since if you take away either of these principles, you incapacitate the party from all power of bearing witness.] *Correspondently* to this [ὅτι] *three are those who bear witness in heaven; the Father, and the Word, and the Holy Spirit; and these three are* THE ONE, the Being of Beings! *If we receive the witness of men*, on human subjects and questions, with confidence, *the witness of God is* infinitely *greater*, both as to subject and certainty, since God is an infinite spirit, and not subject to errour. *Assuredly this is the witness of God, which is witnessed concerning his Son*, as above. *He who believeth in* [this representation of] *the Son of God* [Jesus, the humanity] *hath the witness in himself*, not only of the possibility but of the actual existence, of such a combination, since his own nature is an instance of the same combination of principles as was extant in [the man] Jesus. *He who believeth not God makes him* worse than an honest man, *a liar*, &c.

Under this view of the passage, let us endeavour to state, and compare the editions.

FIRST EDITION.

Who is he who overcometh the world, unless it be one who believes, that Jesus is the Son of God? This is he who came by water and blood; Jesus the Christ: not by water only, but by water and blood: but the spirit is that which beareth witness. They which bear witness then, are these three; the spirit, and the water, and the blood; and these three are combined in one. If we receive the witness of men, the witness of God is greater; *and* assuredly this is the witness of God, which is witnessed of his Son, &c.

SECOND EDITION.

Who is he who overcometh the world, unless it be one who believes that Jesus is the Son of God? This is he who came by water, and blood; Jesus the Christ: not by water only, but by water and blood: but the spirit is that which beareth witness. They which bear witness then, *on earth*, are these three: the spirit, and the water, and the blood; and these three are combined in one. *Correspondently, those who bear witness in heaven are three, the Father, and the Word, and the Holy Spirit; and these three are* THE ONE. If we receive the witness of men, the witness of God is greater; *and* assuredly this is the witness of God, which is witnessed of his Son, &c.

I am justified in affirming, that (as I observed in my former letter) here is no *change of sentiment* in the apostle. Every thing he said formerly he says again now. He *retracts* nothing. Every syllable stands untouched; but he *adds*, and increases the strength, the beauty, and the correspondence member to member, of the passage, while at the same time, his addition is in direct opposition to those opinions, which *peeped* forth toward the close of his long continued life; and which, most certainly, this passage as it stood in the first edition, was not particularly calculated to repress.

You will understand, sir, that I hint at this explanation with great deference, and as a mere conjecture only. Let it be judged by reason and candour, and whatever may be proposed as superiour by any of your learned correspondents, shall at least be accepted with all due respect, by sir,

Yours, &c. FIDELIS.

Conjecture as to the time of the second edition has already fixed on the period of the publication of St. John's Gospel; which was long after the other gospels were in circulation; when, we may suppose, the apostle revised and edited his "works," complete. As to the time of the first edition, we have very little to help our guesses. It is certain, however, that the third epistle of John was written many years before the date assigned to his Gospel, since Gaius, who was host of St. Paul, and of the whole church, was most probably a man advanced in life; and we cannot think it likely that he should live till towards the end of the first century. The first chapter of the first epistle, seems from its contents to have been the precursor of the introduction to the gospel.

DISCOVERY OF A NEW MEPHITICK GROTTO.

M. PULLY, a chymist of celebrity, in one of his excursions in the neighbourhood of Naples, has discovered a new grotto. It is situated on the banks of lake Agnano, not far from lake Averno, and consequently, at no great distance from the *Grotta del Cane*, to which it is in many respects similar. This grotto, from the name of its discoverer, has been called *Grotta-Pully*. It is necessary to keep the face as near the ground as possible, in penetrating into it, in order to avoid the deleterious vapours, which being kept in a state of great volatility by an intense heat, occupy the upper parts. After following many windings, M. Pully discovered at the extremity of the grotto a spring, so intensely hot, that eggs were boiled hard in fifty-seven seconds of time. Réaumur's thermometer, which at the outside was two degrees above 0, rose to sixty-one in the interiour, on being kept in an elevated situation; on bringing it within a foot of the ground, it fell five degrees; but on being stuck into the earth it rose to seventy-five. A barrometer in the same situation fell some degrees. Whoever penetrates into this grotto must be completely undressed; and there, as in the baths of Nero, the body is in a short time covered with water, either from the violence of the perspiration, or from the prodigious quantity of water in a state of evaporation which is always floating in this cavity. This grotto seems to have been unknown to the ancients, who have left us no description of it. Perhaps it has been formed by some of those late volcanick eruptions which have so materially altered the face of the country. The sides of the cave are covered with a variety of saline crytallizations; others hang in the form of stalactites from the roof, which is about ten feet high; its width is of above forty feet at the entrance, and fifty in the interiour. Its length is about 250 feet.

EXTRAORDINARY SAGACITY IN THE CANINE SPECIES.

A SHORT time since, a gentleman at Richmond, Surry, betted his friend a rump and dozen that his dog should go from Richmond bridge to Brentford, and return with half a crown, in two hours. The dog was accordingly taken to the entrance of Brentford, where his master placed half a crown under a stone, and then returned to Richmond. The dog was then despatched to perform his master's wager, and he went immediately to the

spot where the money was formerly placed, but the stone had been removed, and the half crown taken away.

Unable to find the money, the dog ran towards Kew-bridge, where he overtook a gentleman and followed him into his house near the Green. The gentleman endeavoured to drive the animal away, but Prince refused to quit him, and, struck by the singularity of the dog's attachment, the gentleman made no further efforts to part.

The time having elapsed for winning the bet, the owner of the dog expressed a belief that some accident had prevented the animal from returning, and requested his friend to go with him in search of the dog. They then walked to Kew Green, where they observed the gentleman before described coming out of his house, with Prince at his heels. The owner instantly accosted the gentleman, and requested to know how he came by the dog, observing, the dog was his. The gentleman described the manner in which the dog had followed him, and assured the party he had no wish to detain him. The owner then asked the gentleman if he had any thing about him that was not his own property? In answer to this interrogatory he exclaimed: "What do you mean, sir; do you take me for a thief?" The master of the dog replied: "'Pon my honour I mean nothing personal; but the dog has a wonderful sagacity in discovering any article that may have been in my possession. Pray, sir, have you found any thing?"—The gentleman returned: "Why, I have indeed found something of small value: returning from Brentford I picked up half a crown by the road side." The dog's master, with a hearty laugh, exclaimed: "That half crown, sir has been the cause of my dog's attachment to you. My friend and I placed the half crown on the spot you found it to decide a wager, and sent the dog for it; not finding it, he has traced it to you, and, as a proof of the truth of what I assert, put the half crown down among twenty others, and if my dog don't pick it out from the rest, I'll forfeit 100l." The gentleman, with surprise, instantly laid down the half crown among five others. It had been previously marked, and the dog immediately selected it from the rest, and carried it to his master, to the great astonishment of all who witnessed the circumstance.

The dog has frequently done similar exploits, and is considered a most extraordinary animal by the surrounding neighbourhood.

POETRY.

EVENING.

BY CHARLOTTE SMITH.

OH! soothing hour, when glowing day,
Low in the western wave declines,
And village murmurs die away,
And bright the vesper planet shines;

I love to hear the gale of even
Breathing along the new-leafed copse,
And feel the freshening dew of heaven,
Fall silently in limpid drops.

For, like a friend's consoling sighs,
That breeze of night to me appears;
And, as soft dew from Pity's eyes,
Descend those pure celestial tears.

Alas! for those who long have born,
Like me, a heart by sorrow riven,
Who, but the plaintive winds, will mourn,
What tears will fall, but those of heaven?

SOLITUDE.

BY HENRY KIRKE WHITE.

It is not that my lot is low,
That bids this silent tear to flow;
It is not grief that bids me moan:
It is that I am all alone.

In woods and glens I love to roam,
When the tired hedger hies him home;
Or by the woodland pool to rest,
When pale the star looks on its breast.

Yet when the silent evening sighs,
With hallowed airs and symphonies,
My spirit takes another tone,
And sighs that it is all alone.

The autumn leaf is sear and dead,
It floats upon the water's bed;
I would not be a leaf, to die
Without recording sorrow's sigh!

The woods and winds, with sullen wail,
Tell all the same unvaried tale;
I've none to smile when I am free,
And when I sigh, to sigh with me.

Yet in my dreams a form I view,
That thinks on me and loves me too;
I start, and when the vision's flown,
I weep that I am all alone.

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Die mutter starb, ich fand mich mit win selbst
Ein schwaches rohr, und in dem sturm allem.
Gothe in Sancred.

My mother died, I found myself deserted,
A feeble reed, and in the storm alone.

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